بسم الله الرحمن الرحيم

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

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5 Years Analysis of Therapeutic Hypothermia for HIE Neonates in NICUs of Ain Shams University

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By

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Alaa Amir El dawla Abd El fattah Atia

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List of Abbreviations

Abbr.	Full-term
AAP	**:** American Academy of Pediatrics
ACA RI	**:** Resistive index of anterior cerebral artery
ACOG	**:** American College of Obstetrics and Gynecology
aEEG	**:** Amplitude-integrated Electroencephalography
AKI	**:** Acute kidney injury
CBV	**:** Cerebral blood volume
CKBB	**:** Creatine kinase brain band
CT	**:** Computed tomography
DIC	**:** Disseminated intravascular coagulopathy
EAA	**:** Excitatory amino acids
EEG	**:** Electroencephalography
FFP	**:** Fresh frozen plasma
FTOE	**:** Fractional tissue oxygen extraction
GFAP	**:** Glial fibrillary acidic protein
HbD	**:** Hemoglobin difference
HbO_2	**:** Oxygenated hemoglobin
HHb	**:** De-oxygenated hemoglobin
HI	**:** Hypoxia ischemia
HIC	**:** High-income countries
HIE	**:** Hypoxic-ischemic encephalopathy
HR	**:** Heart rate

LFTs : Liver function tests

LMIC : Low-middle income countries

MCA RI : Resistive index of middle cerebral artery

MRI : Magnetic resonance imaging

MRS : Magnetic resonance spectroscopy

NE : Neonatal encephalopathy

NIRS : Near infrared spectroscopy

NSE : Neuron-specific enolase

PCM : Phase change material

RCTs : Randomized controlled trials

$rScO_2$: Regional cerebral oxygen saturation

S100B : S100 calcium-binding protein B

SCFN : Skin subcutaneous fat necrosis

SD : Standard deviation

SIADH : Syndrome of inappropriate antidiuretic hormone secretion

SPSS : Statistical package for social science

TCUS : Trans-Cranial ultrasonography

TH : Therapeutic hypothermia

UCH-L1 : Ubiquitin carboxyl-terminal hydrolase L1

UK : United Kingdom

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ABSTRACT

Background: Therapeutic hypothermia (TH) is a standard of care for neonatal hypoxic ischemic encephalopathy (HIE) in developed countries. Most data come from high income countries (HIC). Recently, experts suggest that the safety and efficacy data on cooling from HIC should not be extrapolated to low and middle income countries (LMIC). Although a number of pilot studies have been reported from LMIC, none of these studies had statistical power to detect significant effects of hypothermia after stratification by country income.

Aim of the Work: Evaluate the practice of TH as a treatment for neonates with HIE admitted to NICUs of Ain Shams University Hospitals from 1/2016 to 12/2020 in a retrospective manner.

Patients and Methods: All HIE babies who were treated with TH were included. Retrospectively, patients' medical records of included babies were reviewed and analyzed. Survived neonates were approached by telephone interview regarding parental views on their neurodevelopment and were offered a formal neurodevelopmental assessment for their babies using Bayley Scale III.

Results: A total of 37 neonates (17 survived and 20 died) were included: 2 mild HIE (survived), 13 severe HIE (all died) and 22 moderate HIE (15 survived and 7 died) (mortality 54.1%). The higher the degree of encephalopathy is associated with decreased survival rate and has highly statistical significance with P-value < 0.005. The most common causes of death are pulmonary hemorrhage (24.3%) and shock (24.3%). Of the 17 survivors, 6 patients couldn't be reached while 9 patients had satisfactory neurodevelopmental progression as per their parents' views while 2 patients had poor outcome. Bayley III scale was done for only 3 babies because the rest of parents refused to comeback to do this scale for their babies. The ages of the 3 babies when Bayley-III done were: 13 months old, 13.5 months old & 14.5 months old. All had normal cognitive and language development. Two of them had normal motor development while one patient had mild to moderate motor delay.

Conclusion: TH might not improve outcome of sever HIE but of great value on outcome of moderate HIE. Prospective future studies are recommended to assess the role of TH as a neuroprotective agent for neonates with HIE in a low resource setting.

Keywords: Therapeutic Hypothermia, HIE Neonates, NICUs.

Introduction

Hypoxic ischemic encephalopathy (HIE) is a neurological complication from the inability to establish and sustain respiration at birth in a newborn. It is the commonest cause of neonatal encephalopathy ***(Wiswill, 2020)*** and a major cause of neonatal morbidity and mortality globally ***(Gebregziabher et al., 2020).***

Approximately 20% to 40% of infants who survive, the brain injury develop significant neurological and developmental impairments. The resulting impact on the child, family and society presents a formidable challenge to healthcare professionals ***(Badr and Purdy, 2006)***.

Perinatal asphyxia is the most important cause of hypoxic-ischemic encephalopathy (HIE) which may occur either intrauterine or postnatally. Intrauterine asphyxia results due to maternal hemodynamic compromise (amniotic fluid embolus), uterine conditions (uterine rupture), or placenta and umbilical cord (placental abruption, umbilical cord knot or compression) and infection. Postnatal asphyxia results from conditions causing neonatal pulmonary failure such as pneumonia or congenital cardiac disease ***(Viaroli et al., 2018).***

The goals of management of a newborn infant who has sustained hypoxic-ischemic insult being at risk for evolving