Neonatal Neurobehavioral Assessment Scale comparing preterm and fullterm neonates

Thesis

Submitted for Partial Fulfillment of Master Degree
In Pediatrics

By

Ebtsam Moustafa Mohamed Mohamed
(M.B;B.Ch.)

Supervised by

Prof. Dr. Mohamed Nasr El-Din Elbarbary
Professor of Pediatrics
Faculty of Medicine - Ain Shams University

Dr. Rania Mohamed Abdou
Lecturer of Pediatrics
Faculty of Medicine - Ain shams University

Faculty of Medicine
Ain Shams University
2016

ACKNOWLEDGEMENT

First, thanks are all due to **ALLAH** for Blessing this work until it has reached its end, as a part of his generous help throughout our life.

My profound thanks and deep appreciation to ***Prof. Dr. Mohamed Nasr El-Din Elbarbary Professor of Pediatrics, Faculty of Medicine, Ain Shams University*** for his great support and advice, his valuable remarks that gave me the confidence and encouragement to fulfill this work.

I am deeply grateful to ***Dr. Rania Mohamed Abdou, Lecturer of Pediatrics, Faculty of Medicine, Ain Shams University*** for her tremendous effort and precious advice for the proper achievement of this work and for her kind help and great cooperation, indeed, this work would not be accomplished without her efforts and advice.

Dr. Ebtsam Moustafa

List of Contents

List of Abbreviations

AERPs .....Auditory Event-Related Potentials

AMOR .....Autonomic, Motor, Organization of State, Responsiveness to Social and Non Social Stimuli

APIB .....Assessment of Preterm Infant's Behavior

NBAS .....Neonatal Behavioral Assessment Scale

List of Tables

List of Tables

List of Figures

List of Figures

INTRODUCTION

The Neonatal Behavioral Assessment Scale (NBAS) was developed in 1973 by Dr. T. Berry Brazelton and his colleagues. The scale represents a guide that helps parents, health care providers and researchers understand the newborn's language ***(Brazelton et al., 2011).***

The Scale looks at a wide range of behaviors and is suitable for examining newborns and infants up to two months old. It was designed to go beyond available assessments by revealing the infant's strengths and range of individuality, while still providing a health screen ***(Brazelton et al., 2011).***

The **NBAS** is based on several key assumptions. First, infants, even ones that seem vulnerable, are highly capable when they are born. They are capable of controlling their behaviour in order to respond to their new environment. Second, infants communicate through their behaviour, like when they take steps to control their environment, such as crying to get a response from their caregivers. Third, infants are social organisms, ready to shape as well as be shaped by the care giving environment ***(Nugent et al., 2009).***

The Scale was built to 28 behavioural and 18 reflex items. It assesses the baby's capabilities across different developmental areas and describes how the baby integrates

these areas as they deals with their new environment ***(Nugent et al., 2009).***

When infants are born they face four developmental tasks vital to their growth. They need to control their autonomic, motor and state development and when an infant's autonomic, motor and state systems are in equilibrium, they are ready to interact socially, the ultimate developmental task. The Scale examines how well the infant manages these interrelated tasks and sees if the baby may need extra caregiving support in some areas ***(Brazelton et al., 2011).***

A premature baby is one who is born too early, before 37 weeks. They may have more health problems and may need to stay in the hospital longer than babies born later. They also may have long term health problems that can affect their whole lives. They are behaviourally challenging, they look different and have an uncertain outcome, some may have social, cognitive, linguistic and behavioural disturbances. They may also have auditory, visual and neuro-developmental deficits. The deficits are later manifested in information processing and attention-related disorders in school, which are probably due to an immature brain and lack of ability to counteract the effects of the environment ***(Als, 1986).***

The NBAS provides an understanding of the baby's behaviour, which may be complex in preterm babies from neonatal units ***(Als, 1986).***

Aim of the Work

The aim of this study is to compare between Neurobehavioral development of preterm and full term neonates using the neonatal behavioral assessment scale and its predictive value in the outcome.

The Neurobehavior of the preterm and full term babies

Healthy full term infants:

Are infants born with a gestational age more than 37 weeks at birth with no major or severe medical illness ***(Brazelton, 2009).***

Healthy preterm infants:

Are infants born with a gestational age less than 37 weeks at birth with no major or severe medical illness ***(Behrman, 2007).***

Risk of prematurity:

Over 1 million children die each year due to complications of preterm birth. Many survivors face a lifetime of disability, including learning disabilities and visual and hearing problems. Although advances in high-risk obstetric and neonatal care have resulted in improved survival of infants born preterm, many studies have documented the prevalence of a broad range of neurodevelopmental impairments in preterm survivors ***(Blencowe et al., 2012).***

Neurodevelopmental disabilities in preterm neonates:

Includes cerebral palsy, mental retardation, visual and hearing impairments, and more subtle disorders of central nervous system function. These dysfunctions include language disorders, learning disabilities, attention deficit-hyperactivity disorder, minor neuromotor dysfunction or developmental coordination disorders, behavioral problems, and social-emotional difficulties ***(Saigal, 2003).***

Preterm infants are more likely to have lower intelligence quotients and academic achievement scores, experience greater difficulties at school, and require significantly more educational assistance than children who were born at term, Long-term impact of preterm birth are shown in Table (1) ***(Marlow, 2005).***

Table (1): Long-term impact of preterm birth on survivors

Long-term out-comes		Examples:	Frequency in survivors:
Specific physical effects	Visual impairment	• Blindness or high myopia after retinopathy of prematurity • Increased hypermetropia and myopia	Around 25% of all extremely preterm affected [a] Also risk in moderately preterm babies especially if poorly monitored oxygen therapy
	Hearing impairment		Up to 5 to 10% of extremely preterm [b]
	Chronic lung disease of prematurity	• From reduced exercise tolerance to requirement for home oxygen	Up to 40% of extremely preterm [c]
	Long-term cardiovascular ill-health and non-communicable disease	• Increased blood pressure • Reduced lung function • Increased rates of asthma • Growth failure in infancy, accelerated weight gain in adolescence	Full extent of burden still to be quantified
Neuro-developmental/ behavioral effectse	Mild Disorders of executive functioning	• Specific learning impairments, dyslexia, reduced academic achievement	
	Moderate to severe Global developmental delay	• Moderate/severe cognitive impairment • Motor impairment • Cerebral palsy	Affected by gestational age and quality of care dependent [f]
	Psychiatric/ behavioral sequelae	• Attention deficit hyperactivity disorder • Increased anxiety and depression	
Family, economic and societal effects	Impact on family Impact on health service Intergenerational	• Psychosocial, emotional and economic • Cost of care [h] – acute, and ongoing • Risk of preterm birth in offspring	Common varying with medical risk factors, disability, socioeconomic status [g]

(O'Connor et al, 2007; Marlow et al. 2005; Doyle et al, 2001).

Fetal Brain Development:

Fetal brain development can be divided into three primary phases: embryonic, midgestation; and the late period lasting up until birth.

By the end of the embryonic period, the basic structures of the brain and central nervous system (CNS) are established. The early fetal period is critical for the development of the neocortex because most cortical neurons are generated for future neural circuits ***(Stiles & Jernigan, 2010; Tau & Peterson, 2010).***