

*Ain-Shams University
Institute of Post-Graduate Childhood Studies*

STUDY OF OXYGEN TOXICITY AND INCUBATORS ON THE EYES, LUNGS AND EARS OF HIGH RISK NEONATES

THESIS

Submitted in fulfilment for Ph.D.in Medical Childhood Studies

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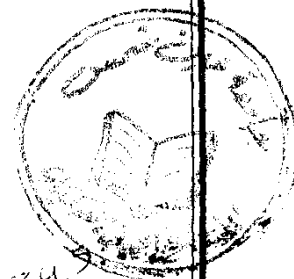
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This work is dedicated to my uncle Prof. Dr. Salah El Ashmawy.

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List of Abbreviations

(dB HL)	Decibels
ABO	Antibodies of major blood group system
ABR	Auditory brain stem response
AGA	Average for gestational age
BPD	Bronchopulmonary dysplasia
BUN	Blood urea nitrogen
CMV	Cytomegalovirus
CPAP	Continuous positive airway pressure
CT	Computed tomography
EEG	Electro encephalogram
FRCO	Functional residual capacity
GFR	Glomerular filtration rate
H ₂ O	Water
HIV	Herpes infection virus
HMD	Hyaline membrane disease
ICROP	International classification of retinopathy of prematurity
IUGR	Intra uterine growth retardation
K ⁺	Potassium
L/S	Lecithin to sphingomyelin ratio
LBW	Low birth weight
MAS	Meconium aspiration
MSAF	Meconium stained amniotic fluid
Na ⁺	Sodium
NBAS	Neonatal behavioral assessment scale
NICU	Neonatal intensive care unit
PDA	Patent ductus arteriosus
RDS	Respiratory distress syndrome
REM	Rapid eye movement
ROP	Retinopathy of prematurity
MMH	Maadi Military Hospital
F.T	Full Term

SGE	Small for gestational age
SP-A	
SP-B	3 apoproteins in pulmonary surfactant
SP-C	
TORCHES	Toxoplasmosis rubella, cytomegalovirus, herpes simplex, and syphilis
VLBW	Very low birth weight

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**1. INTRODUCTION
AND
AIM OF THE WORK**

Study of Oxygen Toxicity and Incubators on the Eyes, Ears and Lungs of High Risk Neonates

Introduction

Retinopathy of Prematurity, Previously called retrolental fibroplasia, is a retinal vascular disease that occurs only in prematurely born infants. Out come can range from complete resolution to blindness. Soon after the recognition of retinopathy of prematurity in 1942 (**Terry, 1942**), it reached epidemic proportions and was regarded as the principal cause of blindness among infants. There was a substantial decline in new cases of retinopathy of prematurity after the uncontrolled use of supplemental oxygen was curtailed (**Patz, et al. 1952**) but at the cost of reduced survival for very low birth weight infants (**Avery, et al. 1960**). Recently, observers have called attention to a "second epidemic" (**Lucey, et al. 1984**) of retinopathy of prematurity and speculated about the causes, effects and implications of the increased incidence (**Robin, et al. 1986**). However, there is little published documentation of the actual incidence (**Priscilla, et al. 1989**).

Infants who requires admission to a new born intensive care unit are said to be at 20 times greater risk for auditory impairment then their healthy counterparts (**Simmons, 1980**). Auditory brainstem responses have been proposed as the basis of systematic screening technique for detection of auditory impairment in the N.I.C.U. (**Schulman, et al. 1979**). The ABR method is feasible for NICU patients, and a significantly high percentage of infants leaving the NICU fail this auditory screening test (**Mainhardt, et al. 1979**). We previously noted an association between failure on the auditory test and prematurity or intraventricular hemorrhage (**Marshall, et al. 1980**), but many of these patients died and the significance of these relationships was not established (**Roberts, et at. 1982**). Bronchopulmonary dysplasia (BPD) has become a substantial

problem among very low birth (VLBW) infants, especially with their increasing survival rates (**Bancalari, et al. 1986**). This disorder is associated with significant morbidity and mortality, including an increased incidence of poor cognitive outcome and growth (**Skidmore, et al. 1992**), cerebral palsy, increased risk for sudden death (**Abman, et al. 1989**), and feeding problems (**Bancalari, et al. 1986**). Recurrent, unrecognized episodes of hypoxemia have been implicated as contributing to some of these sequelae (**Garg, et al. 1988**)

Aim of the Work

This study is designed to show the effect of high oxygen concentration and incubators on the Eyes, Lungs and Ears of high risk neonates who are incubated in the N.I.C.U. of M.M.H. 'Maadi Military Hospital'.

Chapter 1

The Neonate

1. The Newborn Baby :

The weight of the newborn baby averages about 3-4 kg; boys are slightly heavier than girls. About 95% of the fullterm newborn infants weight between 2.5 and 4.6 kg.

Length averages about 50 cm; approximately 95% of infants are within the range of 45 - 55 cm. Head circumference averages about 35 cm, ranging from 32.6 to 37.2 cm

Body proportions of new born infants differentiate them sharply from older infants, children and adults.

The head is relatively larger, the face rounder, and the mandible smaller than older children or adults. The chest tends to be rounded rather than flattened anteroposteriorly, the abdomen is relatively prominent and the extremities are relatively short. The mid point of stature of the newborn infant is near the level of umbilicus - whereas in the adult it is at the symphysis pubis.

At birth, minor traumatic effects of labor may be apparent, such as edema of the vertex or overriding of cranial bones, and infrequently there may be more severe injuries. There may be other minor traumatic variants of little or no significance. Normal anatomic features differentiating the newborn from the older child include external auditory canals that are relatively short and straight, with thicker eardrums that are placed more obliquely to the canal. The middle ear contains a mucoid substance that may be mistaken for an
