

# **Morbidity and Mortality in Neonatal Intensive Care Unit (NICU) of Al-Shifa Hospital in Gaza-Palestine**

*Thesis*

*Submitted for partial fulfillment of the Master Degree  
in Pediatrics*

BY

**Abdel-Raheem Essa Abu Selmia**  
M.B.B.Ch (Ain Shams University)

Under the supervision of

**Prof. Dr/ Ibrahim Saed Abu Saef**

*Professor of Pediatrics  
Faculty of Medicine - Ain Shams University*

**Prof. Dr/ Esmat Abdel-Rahman Abu Asaker**

*Professor of Pediatrics  
Faculty of Medicine – Alazhar University in Gaza*

**Dr/ Soha Mohamed Khafagy**

*Lecturer of Pediatrics  
Faculty of Medicine - Ain Shams University*

**Faculty of Medicine  
Ain Shams University  
2011**

معدل المرض والوفيات في وحدة الرعاية  
المركزة لحديثي الولادة في مستشفى الشفاء في  
غزة - فلسطين

رسالة

توطئة للحصول علي درجة الماجستير في طب الأطفال

مقدمة من

الطبيب/ عبد الرحيم عيسي أبو سلمية

بكالوريوس الطب والجراحة

تحت إشراف

الأستاذ الدكتور/ إبراهيم سعد أبو سيف

أستاذ طب الأطفال

كلية الطب - جامعة عين شمس

الأستاذ الدكتور / عصمت عبد الرحمن أبو عساكر

أستاذ طب الأطفال

كلية الطب - جامعة الأزهر بغزة

الدكتورة/ سها محمد خفاجي

مدرس طب الأطفال

كلية الطب - جامعة عين شمس

كلية الطب

جامعة عين شمس

٢٠١١

## List of Abbreviations

AAP	American Academy of Pediatrics
ACOG	American College of Obstetrics and Gynecologists
ATP	Adenosine triphosphate
BPD	Bronchopulmonary Dysplasia
C.S	Cesarean section
CBF	Cerebral blood flow
Cl <sup>-</sup>	Chloride
CPAP	Continuous Positive Airway Pressure
CPP	Cerebral perfusion pressure
CPR	Cardiopulmonary resuscitation
DM	Diabetes Mellitus
ECMO	Extra corporeal membrane oxygenation
EEG	Electroencephalogram
ELBW	Extremely low birth weight
GA	Gestational Age
GBS	Group B streptococcus
GDM	Gestational Diabetes Mellitus
HIE	Hypoxic ischemic encephalopathy
HMD	Hyaline membrane disease
ICH	Intra cranial hemorrhage
IDM	Infant of Diabetic Mother
IUFD	Intra uterine fetal death
IUGR	Intra uterine growth retardation
L/S	Lecithin/Sphingomyelin ratio
LBW	Low birth weight
LMP	Last Menstrual Period
LV	Left ventricular
MAS	Meconium Aspiration Syndrome
NBS	New Ballard score
NCPAP	Nasal CPAP
PDA	Patent ductus arteriosus
PEEP	Positive end expiratory pressure

## **List of Abbreviations (Cont.)**

PIE	Pulmonary interstitial emphysema
PPHN	Persistent pulmonary hypertension
PROM	Premature rupture of membrane
PVR	Pulmonary vascular resistance
RDS	Respiratory distress syndrome
ROP	Retinopathy Of Prematurity
SB	Still birth
SGA	Small for gestational age
SIADH	Syndrome of inappropriate antidiuretic hormone secretion
TSB	Total Serum Bilirubin
TTN	Transient tachypnea of newborn
WHO	World Health Organization

## List of tables

<i>Table</i>	<i>Title</i>	<i>Page</i>
1	High risk newborn	3
2	Some Methods for Determining Gestational Age	12
3	Clinical Scoring System for Respiratory Distress	22
4	Causes of Respiratory Distress in Neonate	22
5	Factors affecting the incidence of RDS	25
6	Primary pathogens of neonatal pneumonia	34
7	Classification system for persistent pulmonary hypertension of the newborn	36
8	Suggested Maximal Indirect Serum Bilirubin Concentrations (mg/dl) in Preterm Infants	47
9	Bacterial causes of systemic neonatal infections	56
10	Non bacterial causes of systemic neonatal infections	57
11	Differential Diagnosis of Neonatal Sepsis	58
12	Etiologies of perinatal asphyxia	60
13	Stages of hypoxic-ischemic encephalopathy (Quoted from Adcock and Papile, 2008)	65
14	Criteria for whole-body hypothermia for neonates with hypoxic-.ischemic encephalopathy	70
15	Incidence of major malformations in human organs at birth	73
16	Cases admitted during the year 2009.	77

## List of tables (Cont.)

<i>Table</i>	<i>Title</i>	<i>Page</i>
17	Descriptive statistics of the mean age of mothers, gestational age, weight at birth, admission age and duration of stay in NICU in 2009	78
18	Distribution of the main diagnoses of the neonates admitted during the year 2009	79
19	Descriptive statistics of the mean age of mothers, gestational age, weight at birth, admission age and duration of stay in NICU in 2010	80
20	Cases admitted during the year 2010	81
21	Distribution of the main diagnoses of the neonates admitted during the year 2010	82
22	Porportionate mortality of neonates in Al Shifa hospital in Gaza (Palestine) in 2009	84
23	Porportionate mortality of neonates in Al Shifa- hospital in Gaza (Palestine) in 2010	86
24	Comparison between male and female as regards survival in years 2009 and 2010	88
25	Comparison between neonates delivered vaginally & by C.S. as regards survival in years 2009-2010	91
26	Comparison between the year 2009-2010 as regards the mortality rate among different neonatal diagnoses (RDS, Perinatal asphyxia, neonatal respiratory disorder, neonatal sepsis	92
27	Comparison between the year 2009-2010 as regards the mortality rate among different diagnosis (neonatal hyperbilirubinemia, congenital anomalies, infants of diabetic mothers, intra uterine growth retardation and miscellaneous causes	93

## List of Figures

<i><b>Fig.</b></i>	<i><b>Subject</b></i>	<i><b>Page</b></i>
1	Definition of preterm live births by completed weeks of gestation	7
2	Causes of preterm birth	8
3	Neurological criteria for maturity	15
4	Physical criteria for maturity	16
5	Total score (physical plus neuromuscular criteria for maturity)	16
6	Contributing factors in the pathogenesis of Hyaline membrane disease	26
7	Pathogenesis of meconium aspiration syndrome	29
8	Pathophysiology of Neonatal Jaundice	44
9	Major relationship between perinatal asphyxia and cerebral blood flow	63
10	Potential biochemical mechanisms of hypoxic ischemic cerebral injury	64
11	comparison between the two studied years as regards overall survival	83
12	Proportionate mortality rate of neonates in El Shifa Hospital in Gaza in 2009	85
13	Proportionate mortality rate of neonates in El Shifa-Hospital in Gaza in 2010	87
14	comparison between males and females as regards survival in year 2009	89
15	comparison between males & females as regards survival in year 2010	90



## Acknowledgement

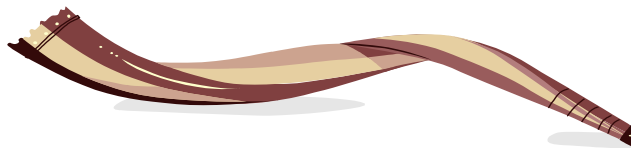
*First and before all, I thank **ALLAH**. I thank him for his great mercy, generous blesses, and for his continuous gifts.*

*I would like to express my sincere thanks and gratitude to **Prof. Dr. Ibrahim Saed Abu Saef** Professor of Pediatrics Faculty of Medicine - Ain Shams University, who helped me a lot by continuous guidance and encouragement. He had the idea of this work and I owe here choosing me to do it.*

*I am greatly indebted to **Prof. Dr/ Esmat Abdel-Rahman Abu Asaker** Professor of Pediatrics, Faculty of Medicine – Alazhar University in Gaza, who gave me valuable directions throughout the work, I was honored that he accepted the supervision of this work,*

*I would like to thank **Dr/Soha Mohamed Khafagy** Lecturer of Pediatrics, Faculty of Medicine-Ain Shams University for her meticulous supervision and support.*

*Finally, my sincere thanks to **my small family** which supported me a lot throughout my life.*



*Abdel-Raheem Essa Abu Selmia*



## Contents

	<i>Page</i>
List of Abbreviations .....	I
List of Figures .....	III
List of Tables.....	V
Introduction .....	1
<b>Aim of work</b> .....	2
<b>Review of literature</b> .....	3
<b>The High Risk Newborn</b> .....	3
Chapter I: Prematurity & Low Weight .....	7
Chapter II: Respiratory diseases of newborn..	21
Chapter III: Neonatal Hyperbilirubinemia.....	43
Chapter IV: Infants of Diabetic Mothers .....	49
Chapter V: Neonatal Sepsis .....	54
Chapter VI: Perinatal Asphyxia .....	59
Chapter VII: Congenital Anomalies .....	72
<b>Subjects and Methods</b> .....	75
<b>Results</b> .....	77
<b>Discussion</b> .....	94
<b>Summary and Conclusion</b> .....	101
<b>Recommendations</b> .....	103
<b>References</b> .....	104
<b>Arabic Summary</b> .....	--

## **Summary and Conclusion**

The newborn infant may be exposed to a number of critical situations that may be associated with increased morbidity if not mortality.

Neonatal morbidity and mortality are important public health problems in developing countries . The neonatal period is considered highly vulnerable time for an infant, who is completing many of the physiologic adjustment required for extra uterine existence .

The aim of this study was to compare retrospectively mortality rate in the last two years in (NICU) of Al-Shifa Hospital in Gaza – Palestine as well as to identify, analyze and evaluate various risk factors. Measures will be implemented in order to improve the neonatal morbidity and mortality rates.

The study was carried on along the period of two years 2009 - 2010, in NICU of Al-Shifa Hospital in Gaza- Palestine. The study included 2517 high risk neonates admitted in NICU.

Respiratory distress was the major, serious, and most common cause of neonatal mortality. Congenital anomalies is the second common cause of death in NICU of Al-Shifa Hospital in Gaza-Palestine, neonatal hyperbilirubinemia is on the other had the most favorable survival rate (97.7%).

Effective preventive strategies to reduce such problems should be based on accurate information about causes and predisposing factors contributing to high rates of neonatal morbidity and mortality.

Improving the obstetric care and intensive care for preterm. Low birth weight neonates will substantially reduce the mortality in AL-Shifa hospital, yet, the siege implemented by Israel over Gaza results in a decrease in the medical supplies important for diagnosis & management of neonatal diseases.

Also, using prohibited weapons by Israel may be the cause of rising incidence of congenital anomalies among neonates born in Gaza.

## **Introduction**

Neonatal morbidity and mortality pose a serious challenge in developing countries. Low level of obstetric care, unsupervised home deliveries and late referrals lead to poor outcome even in special care baby units (SCBU) **(Yola, 2007)**.

Neonatal mortality is highest during the first 24 hours of life and overall accounts for 65% of all infant deaths before 1 year of age. Reduction of morbidity and related mortality depends primarily on prevention of low birth weight neonates, prenatal diagnosis and early treatment of diseases that result from factors acting during gestation and delivery. Candidates for neonatal intensive care unit are babies requiring monitoring of vital signs, those receiving additional oxygen, those needing intravenous fluids and electrolytes, those needing tube feeding, and those receiving antibiotics. Monitoring and supervision of some neonates such as those of diabetic mothers, and jaundiced babies are also done in neonatal intensive care units **(Stoll and Kleigman, 2007)**

Perinatal mortality is influenced by prenatal, maternal, and fetal conditions and by circumstances surrounding delivery. Although post neonatal and child mortality rates have declined dramatically in many developing countries in recent decades, neonatal mortality rates have remained relatively unchanged. Neonatal mortality now accounts for approximately two-thirds of the deaths in children less than 1 year of age, and nearly four-tenths of all deaths in children less than 5 years of age. Worldwide, 98% of all neonatal deaths occur in developing countries, mostly at home and largely attributable to infections, birth asphyxia and injuries, and consequences of prematurity, low birth weight and congenital anomalies **(Moss, 2002)**.

In a study involving six developing countries (Egypt among them) stillbirth rate was 12.5 per 1000 births and early

neonatal rate was 9.0 per 1000 live birth. Prematurity was the main cause of early neonatal deaths (62%) (**Ngoc et al.,2006**).

## **Aim of The Work**

The main objectives of this study were :

- To study retrospectively morbidity and mortality rates in the last two years in (NICU) of Al-Shifa Hospital in Gaza -Palestine.
- To compare the outcome between the year 2009 and the year 2010.

## The High Risk Newborn

### Definition:

High-risk newborns are associated with certain conditions; when one or more of these are present, nursery staff should be aware and prepared for possible difficulties. The cord blood and placenta should be saved after delivery in all cases of high-risk delivery. (Lee, 2008)

### Classification of High Risk Neonates:

*A high risk newborn is caused by either:*

- 1) Maternal conditions,
  - 2) Fetal conditions,
  - 3) Conditions of labour and delivery,
  - 4) Immediate neonatal conditions.
- (Lee and Cloherty 2008).

**Table (1): High risk newborn:**

I. Maternal conditions	Risk to Newborn
1. Maternal age over 40	– Chromosomal abnormalities, SGA
2. Maternal age under 16	– Prematurity, preeclampsia, child abuse
3. Poverty	– Prematurity, infection, SGA
4. Infertility	– LBW, congenital anomalies, increased perinatal mortality
5. Smoking	– SGA, increased perinatal mortality
6. Drug or alcohol abuse	– SGA, fetal alcohol syndrome
7. Diabetes	– Still birth, hyaline membrane disease, congenital anomalies, hypoglycemia
8. Thyroid disease	– Goiter, hypothyroidism, hyperthyroidism
9. Renal disease	– SGA, Still Birth(SB)
10. Urinary tract infections	– Prematurity, Sepsis
11. Heart or lung disease	– SGA, SB, Prematurity

**Table (1): (Cont.)**

12. Hypertension (chronic or preeclampsia)	– SGA, asphyxia, SB, Prematurity
13. Anemia	– SGA, asphyxia, SB, Prematurity, hydrops
14. Isoimmunization (red cell antigen)	– SB, anemia, jaundice
15. Isoimmunization (platelets)	– SB, bleeding
16. Thrombocytopenia	– SB, bleeding
17. Polyhydraminos	– Anomalies (anencephaly, gastrointestinal obstruction, renal disease, goiter)
18. Low urinary esteriols	– SGA, SB
19. Bleeding in early pregnancy	– Prematurity, SB
20. Bleeding in 3 <sup>rd</sup> trimester	– Anemia, SB
21. PROM, fever	– Infection
22. TROCH infection	
23. Past history of infant with jaundice, RDS or anomalies	
24. Maternal medication as steroids, antimetabolites, antithyroid medication, reserpine, salicylates)	
25. Poor diet	– Slightly SGA, fetal wasting, severe malnutrition
26. Hyperthermia	– Fetal anomalies and fetal demise
27. Trauma	– Fetal demise, Prematurity
<b>II. Fetal conditions</b>	<b>Risk to Newborn</b>
1. Multiple birth	– Prematurity, twin transfusion syndrome, asphyxia, trauma.
2. Poor fetal growth	– Fetal demise, SB, asphyxia, congenital anomalies, hypoglycemia
3. Excessive fetal size	– Malformation, trauma, hypoglycemia
4. Abnormal fetal position	– Trauma, hemorrhage, malformation
5. Abnormality of fetal HR or rhythm	– Asphyxia, failure, heart block
6. Acidosis	– Asphyxia, RDS
7. Decreased activity	– Fetal demise, SB, asphyxia