

# **Transient Tachypnea of the Newborn Analysis of risk factors**

*Thesis*

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

*By*

**Marwa Ahmed Mohamed Abdel Latif  
(M.B, B.ch) Ain Shams University**

*Supervised by*

**Prof. Dr. Safaa Shafik Imam  
Professor of Pediatrics  
Faculty of Medicine –Ain Shams University**

**Asst. Prof. Dr. Maha Hassan Mohamed  
Assistant Professor of Pediatrics  
Faculty of Medicine –Ain Shams University**

**Faculty of Medicine  
Ain Shams University**

**2013**



First of all, I would like to thank “*Allah*” who provide me with his unlimited generosity, the medical knowledge, which I hope to be beneficial to people.

I would like to express my great and deep appreciation to *Prof. Dr. Safaa Shafik Imam*, Professor of Pediatrics, Faculty of Medicine, Ain Shams University, who gave me the honor of working under her supervision. She was kind to offer me much valuable time and advice.

I would like also to give my cardinal thanks to *Asst. Prof. Dr. Maha Hassan Mohamed* Assistant Professor of Pediatrics, Faculty of Medicine, Ain Shams University, for her continuous support and direction that make realization of this work much more easy.

*Also, I would like to convey my special thanks to my family for their constant support.*

*Marwa Ahmed Mohamed Abdel Latif*



---

**CONTENTS**

<b>Subjects</b>	<b>Page No.</b>
<b>List of figures</b>	<b>I</b>
<b>List of tables</b>	<b>IV</b>
<b>List of Abbreviations</b>	<b>VI</b>
<b>Introduction</b>	<b>1</b>
<b>Aim of the Study</b>	<b>3</b>
<b>Review of literature</b>	<b>4</b>
<b>Subjects and Methods</b>	<b>72</b>
<b>Results</b>	<b>79</b>
<b>Discussion</b>	<b>104</b>
<b>Summary</b>	<b>119</b>
<b>Conclusion</b>	<b>123</b>
<b>Recommendations</b>	<b>124</b>
<b>References</b>	<b>125</b>
<b>Arabic Summary</b>	<b>-----</b>

## *LIST OF FIGURES*

Figure No.	Title	Page
(1)	Use of surfactant in RDS.	10
(2)	Chest radiograph of an infant with respiratory distress syndrome of the newborn showing homogenous opaque infiltrates and air bronchograms, indicating contrast in airless lung tissue seen against air filled bronchi; decreased lung volumes also can be detected.	12
(3)	Pathophysiology of meconium aspiration syndrome	22
(4)	Chest radiograph of an infant with meconium aspiration syndrome. Chest radiograph shows patchy atelectasis or consolidation	23
(5)	management of meconium aspiration syndrome	25
(6)	This baby with a birth weight 990 grams and 31 weeks of gestational on the second day of life when she developed pulmonary hemorrhage, showed severe bilateral air space disease with air bronchograms (A). There has been some improvement at age. Chest radiography both upper lung field with residual parenchymal densities in both lung field at 2 hours after HFOV treatment (B). Two days after HFOV showed	45

	<b>marked improvement (C)</b>	
<b>(7)</b>	<b>Relative frequencies of occurrence of the various types of esophageal atresia (EA) with and without tracheoesophageal fistula (TEF)</b>	<b>48</b>
<b>(8)</b>	<b>Anteroposterior (AP) view of the chest in a patient with a congenital diaphragmatic hernia (CDH) shows a left-sided Bochdalek hernia.</b>	<b>52</b>
<b>(9)</b>	<b>Risk factors of TTN.</b>	<b>57</b>
<b>(10)</b>	<b>Radiographs of two babies who have transient tachypnea of the newborn of different severity. Note the streaky lung opacities and the fluid in the minor fissure on the right side</b>	<b>64</b>
<b>(11)</b>	<b>Chest radiography shows diffuse parenchymal infiltrates, a "wet silhouette" around the heart, or the intralobar fluid accumulation</b>	<b>64</b>
<b>(12)</b>	<b>Frequency of maternal diabetes in patients and controls</b>	<b>86</b>
<b>(13)</b>	<b>Frequency of hypertension in patients and controls</b>	<b>87</b>
<b>(14)</b>	<b>Frequency of maternal hypertension and diabetes in patients and controls</b>	<b>88</b>
<b>(15)</b>	<b>Frequency of maternal cardiac diseases in patients and controls</b>	<b>89</b>
<b>(16)</b>	<b>Frequency of oligohydramnios in patients and controls</b>	<b>90</b>
<b>(17)</b>	<b>Frequency of thyrotoxicosis in patients and controls</b>	<b>91</b>

(18)	Frequency of maternal hypothyroidism inpatients and controls	92
(19)	Frequency of maternal anemia in patients and controls	93
(20)	Frequency of maternal asthma in patients and controls	94
(21)	Frequency of antepartum and intrapartum hemorrhage in patients and controls	95
(22)	Mode of delivery in patients and controls	96
(23)	Onset of labor in patients and controls	97
(24)	Gestational age in patients and controls	98
(25)	sex in patients and controls	99

## *LIST OF TABLES*

<b>Table No.</b>	<b>Title</b>	<b>Page</b>
(1)	Downe 's score	5
(2)	Diagnosis of Transient Tachypnea of the Newborn	63
(3)	Causes of Tachypnea in a Newborn	66
(4)	Qualitative data of patients group	81,82
(5)	Quantitative data of patient group	83
(6)	Qualitative data of control group	84
(7)	Quantitative data of control group	85
(8)	Comparison between patients and controls as regards maternal age, gestational age and birth weight	85
(9)	Comparison between patients and controls as regards maternal diabetes	86
(10)	Comparison between patients and controls as regards hypertension with pregnancy	87
(11)	Comparison between patients and controls as regards maternal hypertension and diabetes	88
(12)	Comparison between patients and controls as regards maternal cardiac diseases	89
(13)	Comparison between patients and controls as regards oligohydraminos	90
(14)	Comparison between patients and controls as regards maternal thyrotoxicosis	91

(15)	Comparison between patients and controls as regards maternal hypothyroidism	92
(16)	Comparison between patients and controls as regards maternal anemia	93
(17)	Comparison between patients and controls as regards maternal asthma	94
(18)	Comparison between patients and controls as regards antepartum and intrapartum hemorrhage	95
(19)	Comparison between patients and controls as regards the mode of delivery	96
(20)	Comparison between patients and controls as regards onset of labor	97
(21)	Comparison between cases and controls as regards maturity	98
(22)	Comparison between patients and controls as regards sex	99
(23)	Comparison between patients and controls as regards APGAR score	100
(24)	Comparison between patients on CPAP and patients not on CPAP as regards gestational age and birth weigh	101
(25)	Comparison between Patients on CPAP and patients who are not on CPAP who have maternal diseases during pregnancy	102
(26)	Comparison between patients on CPAP and patients not on CPAP as regards onset of labor, mode of delivery and sex	103



## *List Of Abbreviations*

<b>ABG</b>	<b>Arterial blood gases</b>
<b>AP</b>	Antroposterior
<b>AQP5</b>	aquaporin 5
<b>ARDS</b>	Acute respiratory distress syndrome
<b>BPD</b>	Bronchopulmonary dysplasia
<b>BE</b>	Base excess
<b>B.WT</b>	Birth weight
<b>CDH</b>	Congenital diaphragmatic hernia
<b>CHARGE</b>	coloboma, heart defect, atresia choanae, retarded growth, genitourinary abnormalities, and ear anomalies
<b>CI</b>	Confidence interval
<b>CPAP</b>	Continuous positive airway pressure
<b>DM</b>	Diabetes mellitus
<b>EA</b>	Esophageal atresia
<b>ECMO</b>	Extracorporeal membrane oxygenation
<b>FiO2</b>	Fraction of inspired oxygen
<b>GBS</b>	Group B streptococcus
<b>HB</b>	Hemoglobin
<b>HFOV</b>	High frequency oscillatory ventilation
<b>HIV</b>	Human immune deficiency virus
<b>HR</b>	Heart rate
<b>HTN</b>	Hypertension
<b>IDM</b>	Infant of diabetic mother
<b>IC</b>	Intercostal
<b>INO</b>	Inhaled nitric oxide
<b>IV</b>	Intravenous
<b>KPa</b>	Kilopascals
<b>LSCS</b>	Lower segment cesarean section
<b>PaCO2</b>	Partial pressure of carbon dioxide in arterial blood

## *List of Abbreviations*

<b>PO2</b>	Oxygen pressure
<b>MAS</b>	Meconium aspiration syndrome
<b>MgSO4</b>	Magnesium sulfate
<b>MSAF</b>	Meconium-stained amniotic fluid
<b>MV</b>	Mechanical ventilation
<b>NICU</b>	Neonatal Intensive Care Unit
<b>NP</b>	Nasal prong
<b>NO</b>	Number
<b>NPO</b>	Nil per os
<b>PEEP</b>	Positive end expiratory pressure
<b>PLT</b>	Platelets
<b>PPHN</b>	Persistent pulmonary hypertension
<b>PVR</b>	pulmonary vascular resistance
<b>RBC</b>	Red blood cell count
<b>RDS</b>	Respiratory distress syndrome
<b>RR</b>	Respiratory rate
<b>SaO2</b>	Saturation of oxygen in arterial blood
<b>SC</b>	Subcostal
<b>SD</b>	Standard deviation
<b>SGA</b>	Small for gestational age
<b>SP-A</b>	Surface protein A
<b>SP-B</b>	Surface protein B
<b>SP-C</b>	Surface protein C
<b>SPSS</b>	standard computer program software package
<b>SP-D</b>	Surface protein D
<b>SVD</b>	Spontaneous vaginal delivery
<b>TEF</b>	Tracheo-esophageal fistula
<b>TOF</b>	Tracheo-esophageal fistula
<b>TORCH</b>	Toxoplasmosis, Rubella, syphilis, cytomegalovirus, herpes simplex
<b>TTN</b>	Transient tachypnea of the newborn

## *List of Abbreviations*

---

<b>T test</b>	Student t-test
<b>VACTERL</b>	vertebral defects, anal atresia, cardiac malformations, trachea-esophageal fistula, renal dysplasia and limb abnormalities
<b>VRE</b>	vancomycin-resistant enterococci
<b>WBC</b>	White blood cells
<b><math>\chi^2</math></b>	Chi square test

# **Introduction**

Postnatal respiratory complications among term infants are common. The most commonly reported cause of neonatal respiratory distress is transient tachypnea of the newborn with estimated incidence of 1% to 2% of all newborns (*Tutdibi et al., 2010*).

Transient tachypnea of the newborn is usually a benign self limiting disease, but associated hypoxemia, respiratory failure and pulmonary air leak syndromes can increase the risk of morbidity. In severe courses of transient tachypnea of the newborn complications such as pneumothorax, need for extracorporeal membrane oxygenation and death have been reported (*Ramachandrappa and Jane, 2008*). Transient tachypnea of the newborn is thought to be caused by delayed resorption of fetal lung fluid from the pulmonary lymphatic system (*Christian and Kevin, 2007*).

Risk factors include male sex, macrosomia, maternal diabetes, maternal asthma, preterm birth, perinatal asphyxia and cesarean delivery (*Dani et al., 1999*).

The risk of adverse respiratory outcomes in neonates is higher among infants delivered before 39 weeks gestation than after 39 weeks and among infants delivered by elective cesarean

## *Introduction*

---

section in comparison to those delivered vaginally (*Zanardo et al., 2004*).

Respiratory morbidity in late preterm (34-37 weeks' gestation) infants delivered by elective cesarean section has been well documented (*Levine et al., 2001*).

There is considerable evidence that physiologic events in the last few weeks of pregnancy, coupled with onset of spontaneous labor, are accompanied by changes in the hormonal milieu of the fetus and mother, and result in rapid maturation and preparation of the fetus for delivery and neonatal transition (*Jain and Eaton, 2006*).

In recent decades, the rates of cesarean section, especially those performed electively at term and partly at maternal request, have shown an increasing trend (*Menacker et al., 2006*). This situation has drawn attention to the problem of respiratory disorders in term and late preterm infants (*Tutdibi et al., 2010*).

Epidemiological studies reported that elective cesarean section increased the risk of neonatal respiratory morbidity and the rates of admission to the Neonatal Intensive Care Unit (NICU) compared with gestational age matched newborns after spontaneous vaginal delivery (*Tutdibi et al., 2010*). There is not enough data about the incidence of transient tachypnea of newborn in Egypt and associated risk factors.

## **Aim of the study**

The aim of this study is to determine the effect of gestational age, sex, timing and type of delivery on the incidence and course of transient tachypnea of the newborn in late preterm and term pregnancies.

## **Neonatal respiratory distress**

Respiratory distress in neonates is defined as a respiratory rate of more than 60 per minute, dyspnea with intercostal or subcostal indrawing, sternal retraction and a predominantly diaphragmatic breathing pattern. A characteristic expiratory or inspiratory grunt may or may not be present (*Kumar and Bhatnagar, 2005*).

When faced with a neonate with respiratory distress it becomes necessary to compartmentalize the management into an initial phase focusing on the degree of respiratory compromise, resuscitation of the neonate and optimizing its tissue oxygenation, and a planned subsequent phase to clarify the etiology, definitive management and follow up (*Mathur et al., 2002*).

The weight and gestation of the infant and the degree of respiratory compromise would be the key factors to decide the level of care the infant would require. While infants of lower weight and gestation would require more advanced facilities, larger infants can be managed at smaller centers (*Mathur et al., 2002*). Simple clinical scores like Downe's score if meticulously documented at 30-60 minutes intervals are very useful to determine the progression of the respiratory distress (*Diwakar, 2003*).