

Research Article

Risk factors and outcome of respiratory distress syndrome among neonates admitted in Minia neonatal intensive care unit (NICU)

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Abstract

Introduction: Respiratory distress syndrome (RDS), sometimes termed Hyaline Membrane Disease (HMD), represents a major problem in neonatal intensive care units. with the clinical symptoms like tachypnea, poor feeding, nasal flaring, grunting, cyanosis, intercostal retraction and reduction of respiratory sounds in pulmonary auscultation. RDS is the primary cause of neonatal mortality, usually occurring in infants of less than 35 weeks gestation. **Aim of the Work:** To evaluate the risk factors and outcome of neonates with respiratory distress syndrome admitted to NICU in Minia university hospital. To assess the factors predicting the outcome of neonates admitted to NICU in Minia university hospital. **Subjects and Methods:** Study design: This study is a retrospective cohort study conducted to assess the risk factors and outcome of 12 month admitted neonates with respiratory distress syndrome to Neonatal intensive care unit in Minia university hospital from 1/1/2015 until 1/1/2016. **Results:** This study included 120 child admitted to NICU during the period from 1/1/2015 until 1/1/2016. The mean age was 12.2 ± 15.7 days, there were 59 males (49.2%) and 61 females (50.8%). The results of our study are summarized and illustrated in the following tables and figures. **Discussion:** RDS, previously called hyaline membrane disease (HMD), is an acute lung disease of the newborn caused by developmental insufficiency of surfactant production and structural immaturity in the lungs. It can also result from a genetic problem with the production of surfactant associated proteins the best known is hereditary SP-B deficiency It occurs almost exclusively in premature infants; primarily in neonates younger than 36-38 weeks' gestational age and weighing less than 2500 gm. **Recommendations:** Therefore, we recommend the following:

The recording system should be improved to ensure complete and accurate filling of required data (maternal problems, antenatal care, prenatal events and immediate postnatal conditions). Up grading the quality of neonatal care services to achieve better survival among admitted neonates. Increasing the coverage of ANC visits, early dignosis and treatment of maternal illness and discouraging the childbirth at too young age. For late preterm infants associated with high risk factors, it is advised that treatment should be given for promoting lung maturity before selective Cesarean section and that prevention of NRDS be put on the agenda. PS application is still the main treatment measure and adequate application is the key to ensuring the effect of treatment. Once the diagnosis of RDS is established, CPAP should be the treatment of choice. The administration of CPAP decreases oxygen requirements; decreases the needs for mechanical ventilation, decrease period of stay in NICU and may reduce mortality.

Keywords: US: ultrasound, V/Q: Ventilation-Perfusion ratio, VLBW: Very Low Birth Weight

Introduction

Respiratory distress syndrome (RDS), sometimes termed Hyaline Membrane Disease (HMD), represents a major problem in neonatal intensive care units. with the clinical symptoms like tachypnea, poor feeding, nasal flaring,

grunting, cyanosis, intercostal retraction and reduction of respiratory sounds in pulmonary auscultation. RDS is the primary cause of neonatal mortality, usually occurring in infants of less than 35 weeks gestation. (Pickerd and Kotecha, 2009).

It is primarily a disorder of prematurity (usually less than 34 weeks' gestation). Incidence increases with decreasing maturity. It occurs in 75 % of patients of less than 1000 g birth weight, in 50 % of patients with birth weights of 1000 to 1250 g, and in 25 % of patients weighing 1251 to 1500 g. It is major cause of neonatal mortality (4000 deaths/year) and morbidity, with a national health care cost of over 1 billion \$ per year (American Lung Association Web site, 2013).

In 1959, Avery and Mead discovered evidence of deficient surface activity in lung lavage of infants dying of hyaline membrane disease. These findings marked the beginning of systematic research leading to the introduction of surfactant therapy for RDS and further therapeutic applications. Lung surfactant is needed to decrease surface tension and to prevent the collapse of the small airways. RDS is caused by a deficiency in alveolar surfactant due to immaturity of alveolar type II epithelial cells. (Hallman., 2004)

The clinical course depends on the severity of RDS and the size and maturity of the infant at birth. In uncomplicated RDS, typically seen in more mature infants, recovery occurs over several days, and infants generally no longer require oxygen or ventilatory support after the first week of life. The most premature infants are at greatest risk for severe RDS and frequently develop complications, including central nervous system (CNS) hemorrhage, patent ductus arteriosus (PDA), air leak, and infection, which contribute to prolonged requirements for oxygen and ventilatory support (Whittset et al., 2005).

In recent years, the outcome of patients with RDS has improved with the increased understanding of the pathophysiology and management of these infants (Jobe et al., 1993) Advances include:

- (1) The use of antenatal steroids to enhance pulmonary maturity.
- (2) Appropriate resuscitation facilitated by placental transfusion and immediate use of continuous positive airway pressure (CPAP) for alveolar recruitment.
- (3) Early administration of surfactant.
- (4) Using gentle modes of ventilation to reduce barotrauma and minimize damage to the

immature lungs. These therapies have also resulted in the survival of extremely premature infants (Donn and Sinha, 2006)).

Sequelae of RDS include septicemia, bronchopulmonary dysplasia (BPD), patent ductus arteriosus (PDA), pulmonary hemorrhage, apnea or bradycardia, Necrotizing enterocolitis (NEC), Retinopathy of prematurity (ROP), hypertension, failure to thrive, intraventricular hemorrhage (IVH), and/or periventricular leukomalacia with associated neuro-development and audiovisual handicaps (Bancalari et al., 2005).

Aim of the Work

- To evaluate the risk factors and outcome of neonates with respiratory distress syndrome admitted to NICU in Minia university hospital.
- To assess the factors predicting the outcome of neonates admitted to NICU in Minia university hospital.

Subjects and Methods

Study design

This study is a retrospective cohort study conducted to assess the risk factors and outcome of 12 month admitted neonates with respiratory distress syndrome to Neonatal intensive care unit in Minia university hospital from 1/1/2015 until 1/1/2016

Justification of the study:

Neonatal Intensive care is predominantly concerned with the management of neonates with acute life threatening conditions in a specialized unit. Caring of critically ill neonates remains one of the most demanding and Challenging aspects of the field of Neonatology. We conducted this study to document the respiratory distress syndrome number, pattern outcome and risk factors of the disease in neonates admitted to our Neonatal intensive care unit. This may help to assist health workers and planners to pay due attention for better utilization of health care facilities because better understanding leads to better management.

Administrative design

An approval was taken from the director of pediatric department.

Ethical consideration:

The study was approved by the ethical committee of the Faculty of Medicine, Minia University and Following ethical guidelines of epidemiological research and ethical committee.

Research strategy:**1-Preparation of the study:**

A- Reviewing literature in different libraries and internet regarding the NICUS, indication of admission, risk factors and outcome.

B- Designing the questionnaire that will be used in the study.

Results

This study included 120 child admitted to NICU during the period from 1/1/2015 until 1/1/2016. The mean age was 12.2 ± 15.7 days, there were 59 males (49.2%) and 61 females (50.8%).

The results of our study are summarized and illustrated in the following tables and figures.

Table (1): Demographic data of newborn infants affected by respiratory distress syndrome:

| Data | | Total =120 | |
|----------------------------------|--|-----------------|-------|
| Age (days) | Range | 1-72 | |
| | Mean \pm SD | 12.2 \pm 15.7 | |
| Sex | Male | 59 | 49.2% |
| | Female | 61 | 50.8% |
| Weight (kg) | Range | 0.75-2.6 | |
| | Mean \pm SD | 1.4 \pm 0.4 | |
| Gestational age (month) | Range | 24-38 | |
| | Mean \pm SD | 31.6 \pm 3.1 | |
| Mode of delivery | SVD | 47 | 39.2% |
| | CS | 73 | 60.8% |
| Single of multiple | Single | 24 | 20% |
| | Twins | 85 | 70.8% |
| | Triple | 10 | 8.4% |
| | Quadruplet | 1 | 0.8% |
| Maternal age (years) | Range | 16-45 | |
| | Mean \pm SD | 27.1 \pm 6.5 | |
| Maternal illness during prgnancy | Normal | 8 | 6.7% |
| | DM | 34 | 28.3% |
| | PROM | 39 | 32.5% |
| | Placenta previa and placenta abruption | 9 | 7.5% |
| | Hypertensive disorders | 11 | 9.2% |
| | Cardiac | 9 | 7.5% |
| | Others * | 10 | 8.3% |

* Others (ectopic pregnancy, hyperprolactenemia, UTI and infertility).

Table 1: show that the mean weight of the studied newborn was 1.4 ± 0.4 kg, the mean gestational age was 31.6 ± 3.1 weeks. 60.8% of them delivered by CS. Nearly 70.8% were twin deliveries, Regarding their maternal age its mean was 27.1 ± 6.5 years. 32.5% of mothers had PROM, 28.3% had DM, 9.2% had hypertension and only 6.7% were normal pregnancy.

Discussion

RDS, previously called hyaline membrane disease (HMD), is an acute lung disease of the newborn caused by developmental insufficiency of surfactant production and structural immaturity in the lungs. It can also result from a genetic problem with the production of

surfactant associated proteins the best known is hereditary SP-B deficiency It occurs almost exclusively in premature infants; primarily in neonates younger than 36-38 weeks' gestational age and weighing less than 2500 gm. (Malloy, 2009).

This study retrospective cohort study included 120 neonate admitted to Minia NICU during the period 1/1/2015 until 1/1/2016.

The Mean age was 12.2 ± 15.7 days, there were 59 males (49.2%) and 61 females (50.8%). This study aims to evaluate the risk factors and outcome of neonates with respiratory distress syndrome admitted to NICU in Minia university hospital and to assess the factors predicting the outcome of neonates admitted to NICU in Minia university.

In the present study females were affected more than males .In a study done by Jenny et al., (2004) Male sex was found to be a risk factor for respiratory distress syndrome and in another study done by Bryan et al., (1990) male and female neonates were equally at risk for respiratory distress syndrome and for ventilator support .

This study shows that the Mean weight of the studied newborn was (1.4 ± 0.4) kg which in agreement with Fehlmann et al., (2010) who studied impact of respiratory distress syndrome in very low birth weight infants and found that respiratory distress syndrome had high incidence in very low birth weight infants despite frequent use of antenatal steroids . Valentina et al., (2016) analyzed incidence and risk factors of respiratory distress syndrome at different gestational age and found that low birth weight is the main risk factor of RDS, with higher odds ratio in term births. Donald et al., (1999) reported that Mortality and morbidity particularly RDS are increased among infants born at term whose birth weights are at or below the 3rd percentile for their gestational age. These results were comparable to those obtained by Benjamin et al., (2005) who reported that newborns with RDS syndrome had lower birth weight than those who were healthy neonates, and this agrees also with the results obtained by Sritipsukho et al., (2007) who reported that RDS is more common in neonates with low birth weight.

Recommendations

Therefore, we recommend the following:
The recording system should be improved to ensure complete and accurate filling of required data (maternal problems, antenatal care,

prenatal events and immediate postnatal conditions).

Up grading the quality of neonatal care services to achieve better survival among admitted neonates.

Increasing the coverage of ANC visits, early dignosis and treatment of maternal illness and discouraging the childbirth at too young age.

For late preterm infants associated with high risk factors, it is advised that treatment should be given for promoting lung maturity before selective Cesarean section and that prevention of NRDS be put on the agenda.

PS application is still the main treatment measure and adequate application is the key to ensuring the effect of treatment.

Once the diagnosis of RDS is established, CPAP should be the treatment of choice. The administration of CPAP decreases oxygen requirements; decreases the needs for mechanical ventilation, decrease period of stay in NICU and may reduce mortality.

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