The Pattern of Diagnosis in NICU Population Presenting With Respiratory Distress

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ABSTRACT

Objective: To evaluate the etiology, frequency, and results of respiratory distress in newborns in the intensive care unit.
Study Design: Descriptive cross sectional study.
Place and Duration of Study: Neonatal Intensive Care Unit, CMH Peshawar, from Aug 2020 to May 2021
Methodology: It included neonates admitted to the Neonatal Intensive Care Unit between the ages of 0 and 28 days
Results: The study included 182 neonates, 107 (58.6%) of whom were boys and 75 (41.4%) were girls. The average age was 68.47 ± 98.60 hours, the average gestational age was 32.6 ± 23.52 weeks, and the average weight was 2.50 ± 2.6 kg. All (100%) of the neonates had a respiratory rate >60 breaths per minute. Regarding symptoms and signs, 110 (60%) reported grunting, 182 (100%) reported nasal flaring and subcostal retractions, and 72 (40%) reported cyanosis. Respiratory distress syndrome, meconium aspiration syndrome, pneumonia, transient tachypnea of the newborn, sepsis, and birth asphyxia was observed in 42 (22.8%), 30 (16.6%), 32 (17.6%), 26 (14.1%), 32 (18.04%), and 20 (10.8%) newborns, respectively. The number of 60 (33.2%) neonates were suffering from respiratory distress.
Conclusion: High frequency of respiratory distress among the neonates was observed along with high rates of mortality in those having respiratory distress, especially in low birth weight and pre-term neonates.

Keywords: Causes, Neonates, Outcome, Respiratory distress.

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INTRODUCTION

Respiratory distress is amongst the commonest reasons for an infant's admission to the neonatal intensive care unit.[1] Significant respiratory morbidity affects 15% and 29% of the term and late preterm infants admitted to the neonatal intensive care unit, respectively; this figure is even higher for infants born before 34 weeks of gestation.[2] Some particular risk factors make the neonatal respiratory disease more likely. Maternal chorioamnionitis, gestational diabetes, caesarian section delivery, meconium-stained amniotic fluid (MSAF), prematurity, or prenatal ultrasono-graphic findings such as structural lung abnormalities or oligohydramnios are among these risk factors.[3,7] In cases where the newborn infant is able to cope with the extra-uterine environment, survival is critical. At the time of delivery, every aspect of the body system wents through significant physiological changes.[8] Adaptation of the lungs is arguably the most important to survival.[9] The placenta and umbilical vessels provide a constant supply of oxygen and nutrients to the foetus in utero, and the maternal circulation also manages carbon dioxide excretion. Fluid secreted by the respiratory epithelium fills the lungs.[10] Nevertheless, it is not always possible to predict about infants getting symptomatic before birth is not always possible. Ignoring the reason for disease, if respiratory distress remains unrecognized and treated promptly, it can progress to cardiopulmonary arrest and respiratory failure. As a result, it is critical for any health care clinician taking care of the newborn infants to quickly observe the symptoms and signs of respiratory distress, find out and differentiate between the possible causative factors, and start working for the management to avoid serious complications and mortality.

Respiratory distress is a disease that is symptom complex and shows up with different types of sicknesses, clinical causes, aetiology, and results.[11] Pathologic lesions of a great variety might appear to be the cause of respiratory distresses, such as congenital heart disease (CHD) (4.3%), birth asphyxia (BA) (7.5%), transient tachypnoea of the newborn (TTN) (11.7%), sepsis (12.5%), meconium aspiration syndrome (MAS) (16.7%), respiratory distress syndrome (RDS) (20.8%), hyaline membrane disease (HMD), pneumonia (22.5%), and some other.[12] Meanwhile recognizing different aetiologies and their frequency, minimized investigations is possible by starting from recognizing the commonest causative agent of the disease in our

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local settings, then making the hospital policies in accordance with the commonest aetiologies with their consequences. To determine the causative factors of respiratory distress, a comprehensive history, together with the postnatal, natal, and prenatal history, as well as a complete radiological, laboratory, and physical examination and investigation is required. In newborns who present with respiratory distress, a chest radiograph must be brought right away. blood culture, complete blood count (CBC) with differential count, arterial blood gas (ABG) concentrations, and serum glucose test are all useful laboratory tests.[13]

The purpose of this particular research was to determine the causative agents of respiratory distress in newborns admitted to the NICU along with their hospital consequences. It is critical to understand the commonest causes of respiratory distress we commonly come across in a given unit. This will aid in the better future management of patients with this disease.

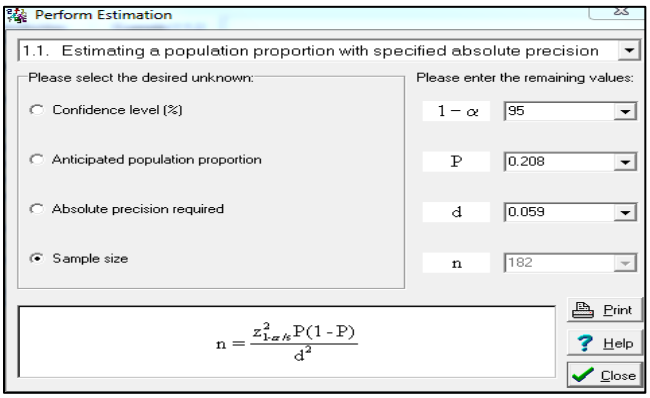

Figure: Estimating a population prrportion with specified absolute precision.

METHODOLOGY

This study was conducted on 182 newborns chosen according to non-probability consecutive sampling from August 2020 to May 2021. The sample size was calculated by using WHO calculator at 95% confident level and 5.9% margin of errors using frequency of 20.8% for respiratory distress syndrome form previous study.[12] Every newborn from its birth to 28 days of age, either male or female, brought to the NICU with a gestational age of greater than 28 weeks and a weight of more than 1000 gm was selected. Neonates with postoperative respiratory distress, congenital anomalies, and syndromes were not included. Every newborn brought to the NICU was examined and taken with the consent of parents written on paper. Then, the newborns were evaluated to check the incidence of respiratory distress, which was considered to be present if any one or more than one of the following characteristics were observed: cyanosis, nasal flaring, grunting, chest wall retraction, and respiration rate more than 60 breaths per minute. The results were defined as discharged only if the newborn recovers completely from the symptoms and signs as well as from the incidence of all the following mentioned clinical features: being mother fed at least four times in a day, a saturation of oxygen more than 95% on room air, and no symptoms left for the respiratory distress. The alternative outcome was mortality.

To determine the various etiologies of respiratory distress, a history, examination, and investigations were performed. RDS was assigned to neonates who got the disease within half a day and revealed any of the following features upon a chest X-ray: ground-glass opacity, reticulogranular pattern, and poor expansion with air bronchogram. TTN was diagnosed in neonates who experienced the disease shortly after their birth and revealed any of the following features upon chest X-ray: interlobar fissure oedema, prominent perihilar marking, and hyperinflation. MAS was labeled if the newborns were revealed with meconium staining of any of the following types: Skin, umbilical cord, nails, and liquor skin, with a chest X-ray revealing bilateral patchy infiltrates with atelectasis and emphysematous changes.

Neonates were diagnosed with Sepsis if they had a history of poor feeding or lethargy and a complete blood count (CBC) demonstrating a total leukocyte count (TLC) of more than 30,000 or 5000 per µl. The neonates were diagnosed with Pneumonia who developed respiratory distress at any time during the neonatal period and revealed bilateral patchy opacities upon chest X-ray. Birth asphyxia was diagnosed in neonates who had a history of delayed crying, a low Apgar score of 3 for 5 minutes, and ABGs that showed acidosis with a PH of 7.0. All neonates received quality care, including recurrent observing and, if necessary, supported by ventilators. Neonates were dismissed if all the symptoms of respiratory distress disappeared, greater than 95% saturation of O2 on room air, and were mother fed at least four times a day. The expert doctor regularly examined and investigated some particular cases of respiratory distress for about a month, and the outcome was recorded as Discharge or Death. Data were entered into a specially designed proforma.

Data Analysis

The data was analyzed using Statistical Pac-kage for the social sciences (SPSS) version 20. For all categorical/qualitative variables, such as aetiologies, gender, outcomes (death or discharge), Apgar score, frequencies, and percentages were calculated (Birth asphyxia, TTN, MAS, Pneumonia, RDS, and Sepsis). Gestational age, age of incidence of respiratory distress, weight, and age were all averaged. To determine the effect of age, gender, and gestational age on the outcome, stratification was performed.

RESULTS

There were 182 neonates among the more than 500 patients screened, with 107(58.6%) boys and 75 (41.4%) girls (and respectively). The mean gestational age was 32.69±1.16 weeks, and the mean weight was 2.52 ± 0.25 kg. All (100%) of the neonates had a respiration rate recorded more than 60 breaths per minute. In terms of signs and symptoms as shown in Table-I, 110 individuals (60%) reported grunting, 182 people (100%) reported subcostal retractions and nasal flaring, and 72 people (40%) reported cyanosis. Respiratory distress syndrome, meconium aspiration syndrome, pneumonia, transient tachypnea of the newborn, sepsis, and birth asphyxia was observed in 42 (22.8%), 30 (16.6%), 32 (17.6%), 26 (14.1%), 32 (18.04%), and 20 (10.8%) newborns, respectively. The number of 60 (33.2%) neonates were suffering from respiratory distress. Table-II demonstrates respiratory distress in 182 patients.

Table-I: Respiratory distress's signs and symptoms.

Signs and Symptoms	n (%)
Grunting	110 (60)
Subcostal Retraction	182 (100)
Respiratory Rate>60 B/mint	182 (100)
Cyanosis	72 (40)
Nasal Flaring	182 (100)

Table-II: cause of Respiratory distress (n=182).

Causes	n (%)
Sepsis	33 (18.05)
TTN	26 (14.1)
Birth asphyxia	20 (10.8)
MAS	30 (16.7)
RDS	42 (22.75)
Pneumonia	31 (17.6)

**TTN: Transient tachypnea of the newborn. *MAS: Meconium aspiration syndrome. *RDS: Respiratory distress syndrome.*

MAS was found in 29 (16.1%), 1 (0.48%), 3 (1.5%), 27 (15%) neonates by age and weight while RDS 42 (23%) was the commonest causative agent of respiratory distress in newborns less than 24 hours old, followed by MAS 41 (22.4%). The commonest death-causing factor in neonates older than 24 hours was sepsis 31 (17.1%), subsequently pneumonia 30% (16.5%). Table-III.

Table–III: Respiratory Distress Causes by age and weight.

Diagnosis	Age (0-24 hrs)	Age >4hrs	Weight <2.5Kg	Weight >2.5Kg
Sepsis	2 (0.97%)	31 (17.1%)	17 (9.2%)	16 (8.7%)
TTN	25 (13.7%)	1 (0.48%)	9 (5.3%)	16 (8 .7%)
Birth Asphyxia	17 (9.2%)	3 (1.5%)	6 (3.4%)	13 (7.3%)
MAS	29 (16.1%)	1 (0.48%)	3 (1.5%)	27 (15%)
RDS	42 (23%)	0 (0%)	41 (22.4%)	1 (0.48%)
Pneum-onia	1 (0.97%)	30 (16.5%)	11 (5.8%)	21 (11.7%)
Total	117 (64%)	66 (36%)	87 (48%)	95 (52%)

DISCUSSION

The range of causative factors of respiratory distress in newborns involves various clinical situations. In this particular study, pneumonia (18%) and sepsis (18%) were found to be the commonest causes of respiratory distress in newborns. When compared to previous reports, the prevalence of neonatal sepsis and pneumonia was nearly equal (18.7% and 25%, respectively).[14,15] The difference could be attributed to unhygienic conditions, birth delivery by low-key personnel, or locomotion between different hospitals ignoring the precautions and hygiene. Previous researches of newborns having respiratory distress,[17] included neonates whose birth delivery was done in a hospital with the help of professional personnel and received regular care from birth. The critical significance of respiratory disturbance in newborns can be felt by considering the fact that newborns having this disease are 2 to 4 times more prone to mortality than other newborns without respiratory disturbance. With a 40% rate of child mortality worldwide occurring during neonatal times, middle and low-income countries require simple and effective techniques to enhance neonatal care in the hospitals.[18] It is necessary to understand the causative factors of respiratory distress in order to construct facilitative plans. All in all, 33% was recorded to be the death rate in this research, which is relatively lower than the reportings of other centers. RDS, MAS, and TTN were recorded to be 23%, 17%, and 14%, respectively, whereas reports from developing count-ries record 18%, 16%, and 14%. This difference is most probably because of adequate hospital facilities.[19]

Symptoms and signs of respiration rate more than 60 breaths per minute were recorded in all the 182 patients (100%), 72 (40%) with cyanosis, 182 with nasal flaring (100%), 182 with subcostal retractions (100%), and 110 with grunting (60%). Previous research found that 45.8% of neonates grunted, 88% with subcostal retractions, 90% with nasal flaring, and 98.2% with cyanosis.[20,21] The patients of this particular study were more prone to adverse symptoms and signs, pulmonary morbidity, and mortality and all of these rates were comparable to those newborns admitted to hospitals with high-level care.[22,23] The majority of the morbidity and mortality occurred in newborns having birth with low weight and low age of gestation. In one large population study, grunting and cyanosis were recorded in 67% and 70% of newborns, respectively.[24] Another study recorded that 83.4% of newborns having pneumonia showed speedy breathing, 79.1% faced breathing difficulty and 81% were fed poorly.[25] Breathing difficulty, poor feeding, and rapid breathing are clear and helpful signs of respiratory distress in primary newborn care. Previous studies related to pneumonia of the neonates involved only newborns with radiological findings and did not take blood culture positivity into account in the process of detecting pneumonia in the neonates. In one of these studies,[26] 37.9% of newborns with respiratory distress had pneumonia as well. One other research found that 35% of newborns had respiratory distress, whereas this particular research recorded that 17.6% of them did.

The study's limitation is the fact that every single causative factor of respiratory distress was not addressed, such as heart patients being admitted to a tertiary care cardiac hospital's paediatric cardiology unit. As they were not included in the study, we were unable to learn the outcome. Similarly, newborns who developed respiratory distress because of surgical factors were sent to the surgical section and were therefore excluded.

CONCLUSION

Sepsis, TTN, birth asphyxia, MAS, pneumonia, and RDS were the commonest causes of respiratory distress. RDS was the leading cause of death due to related issues such as preterm birth and birth with low weight, leading to sepsis. Each neonate having TTN was released. Individual studies on other causes may be conducted in order to gain a better understanding of management and outcome.

Conflict of Interest: None.

Author Contribution

HU: Conceived and design the study initial drafts, AM: Review and statistical analysis approved the final drafts, AR: Study design critical review, RR: Data compilation editing and statistical analysis, IU:, MA: Data collection and review.

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