Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

Clinical Profile of Respiratory Distress Syndrome in Neonates in Rural Tertiary Care Centre

Sushma Myadam[1], Ashish Varma2

[1]Junior Resident, Dept. of Paediatrics, Jawaharlal Nehru Medical College, DattaMeghe Institute of Medical Sciences, Sawangi, Wardha.
[2]Professor, Dept. of Paediatrics.Jawaharlal Nehru Medical College, DattaMeghe Institute of Medical Sciences, Sawangi,Wardha.
e-mail:sushma.myadam@gmail.com, avarma2055@gmail.com.

Corresponding author:
SushmaMyadam, Junior Resident: Paediatrics, Jawaharlal Nehru Medical College, DattaMeghe Institute of Medical Sciences, Sawangi, Wardha.
sushma.myadam@gmail.com.
Type of Article: Study Protocol.
Conflict of interest: None.
Funding: None

Abstract:
Background: Respiratory distress syndrome is a common clinical entity in premature neonates. Premature neonates usually die of respiratory distress syndrome, if not intervened.
Objectives: To study the clinical profile of respiratory distress syndrome in neonates.
Methods: All neonates diagnosed with respiratory distress syndrome will be included in the study, after informed consent over a period of two years. The respiratory distress in the neonates will be assessed for the severity of breathing efforts using Silverman Anderson score,Outcome of neonates will be studied if they will be discharged or succumbed. The clinical course, clinical findings, investigations and treatment received will be studied. The morbidity of neonates will be determined by duration of stay in NICU. All the complications of prematurity will be recorded using appropriate using clinical methods and investigations. Appropriate statistical test will be applied on the data collected data over a period of 2 years.
Expected results: the study will collect data on total number of cases of RDS, maternal factors, fetal factors and interventions required. The study will be record on the type of study on the surfactant,CPAP or mechanical ventilation help in the improvement of the neonate. There comparative analysis will be carried out. The causes of mortality and morbidity will be recorded. A causative analysis of complications occurred during the stay of neonates will be respiratory distress syndrome will be carried out in an analytical manner to improve the condition of the neonate.
Conclusion: the immediate and late complications of prematurity, the type of therapy required to improve the clinical deterioration in RDS will be noted. The study will observe causes of prematurity leading to RDS and methods to reduce respiratory distress in the neonates. This will help in the management of RDS.
Keywords: prematurity, Respiratory Distress Syndrome (RDS), neonates, NICU

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

INTRODUCTION:

The most prevalent respiratory condition in preterm infants is Respiratory Distress Syndrome(RDS), also known as hyaline membrane disease (HMD)Inadequate pulmonary surfactant are the main cause of RDS.(1) Surfactant is a complex mixture of phospholipids, neutral lipids, and proteins which is synthesized and secreted from alveolar type II cells of the lungs. There has been reduced compliance and a propensity to atelectasis in structurally and surfactant deficient lungs.(2) Alveolar radius and poor chest wall decreased, raising the risk of atelectasis. This refers to the imbalance of ventilation perfusion and alveolar hypoventilation with the resulting hypoxemia and hypercarbia.(3)decreased o2 delivery, anaerobic metabolism and resulting lactic acidosis result from extreme hypoxemia and systemic hypoperfusion. Hypoxaemia and acidosis, resulting in right-to left shunting at the levels of the foramen ovale and ductusarteriosus, can further impair oxygenation by causing pulmonary vasoconstriction.(4) Other factors can activate the release of inflammatory cytokines and chemokines that cause further endothelial and epithelial cell injury, such as baro trauma and high fio2.(5) The injury results in decreased synthesis and function of the surfactant as well as increased endothelial permeability that contributes to pulmonary edema. By inducing surfactant inactivation, the leakage of proteins in to the alveolar space further exacerbates surfactant deficiency.(6)

Infants <35 weeks RDS usually affects infants Gestational Age (GA) but can impact older infants with delayed maturation of the lungs. The highest risk factor for RDS is low GA, and its occurrence varies inevitably with birth. Weight among AGA babies.(7)

Birth Weight (g)	Incidence of RDS
501-750	86%
751-1,000	79%
1,001-1,250	48%
1,251-1,500	27%

Due to the existence of circulating weak fetal androgens that inhibit surfactant phospholipid development, due to this male infants are at higher risk for RDS. Due to increased fetal insulin development, maternal diabetes is correlated with RDS, which inhibits the production of proteins essential for the function of surfactants.(8)

Immediately after birth or within 4 hrs, signs of RDS appear. Tachypnoea (>60 breaths/min), intercoastal and subcoastal retractions, nasal flaring, grunting, and cyanosis in room air are characterised by RDS. Hypotension, acidosis, and hyperkalaemia can include other clinical features.(9) Low lung volumes and a bilateral, reticular granular (ground glass appearance) pattern with superimposed air bronchograms are seen in the standard chest radiograph.(10) In more serious cases, the white out of the lung fields is complete. Antenatal monitoring is conducted because gestational age is a good indicator of the likelihood of RDS and intrusive amniocentesis in amniotic fluid samples to confirm lung maturity. (11) RDS risk is low when the L/S ratio is >2, but maternal diabetes, erythroblastosisfetalis, and intrapartum asphyxia are significant exceptions. ABG which suggestive of hypoxaemia and hypercarbia.(12)

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

Antenatal glucocorticoids, (b) continuous positive airway pressure(CPAP) and positive-end expiratory pressure(PEEP), and (c) surfactant replacement therapy were the three most notable developments in the prevention and treatment of RDS. (13) These have lowered morbidity and mortality of RDS significantly. Surfactant administration which shows that 2 doses, 12 hrsapart , may be more effective than single dose therapy. (14) More than 2 doses is rarely needed and is rarely effective. The surfactant dosage is as follows: Infasurf 3 ml/kg, Survant 4 ml/kg . The project is undertaken to study the clinical profile, treatment modalities, and its outcome in respiratory distress syndrome in rural tertiary care centre.(15)

RESEARCH QUESTION:
What is the clinical profile of Respiratory Distress Syndrome in Neonates in Tertiary care centre?
PICOT FORMAT:
P – Neonates with respiratory distress syndrome
I –
C-
O- Mortality and morbidity
T- October 2020 to September 2022.

AIMS AND OBJECTIVES:

Aim:

To study the clinical profile of Respiratory Distress Syndrome in Neonates in Tertiary care centre.

Objectives:

1. To assess severity of Respiratory Distress Syndrome in Neonates
2. To study the diagnostic evaluation in respiratory distress syndrome
3. To study treatment modalities and its correlation in respiratory distress syndrome

MATERIALS AND METHODS:

SETTING: -
The research will be conducted at AcharyaVinobaBhave Rural Hospital setup in Wardha district of Maharashtra, India.

TYPE OF STUDY: -
Prospective cross-sectional observational study.

STUDY POPULATION: -
All newborns admitted with the diagnosis of respiratory distress syndrome in NICU at AVBR Hospital with the diagnosis of respiratory distress syndrome

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

SAMPLE SIZE: - 40

IEC APPROVAL: -
The study will be conducted after approval from institutional ethical committee.

INCLUSION CRITERIA: -
All cases admitted in NICU with diagnosis of respiratory distress syndrome.

EXCLUSION CRITERIA: -
Congenital surfactant deficiency
Malformations of respiratory tract.

ETHICAL COMMITTEE CLEARANCE: -
The study will be started after approval from intuitional ethical committee.

METHODOLOGY: - RDS is a condition predominately found in preterm newborn due to deficiency of surfactant in the lungs, leading to respiratory distress, hypoxemia, radio-opaque poorly ventilated lungs and good response to surfactant therapy.
The study will be conducted after taking consent from parents of neonatal population admitted in NICU with diagnosis of respiratory distress syndrome
Details from the mother regarding obstetric history like age, parity, gestation, last menstrual period, expected date of delivery, antenatal evaluation and history of receiving antenatal steroids, maternal illness like eclampsia, pre-eclampsia, gestational diabetes or other significant medical history.
Intranatal assessment of foetal well-being will be noted.
Type of delivery, resuscitative measures, birth weight, gestational age as per USG and/or new Ballard score will be used.

- After admission in NICU standard protocol will be followed as per AVBRH NICU guidelines for assessment , investigation and treatment
- It includes oxygen therapy in the form of oxygen by prongs, c pap, high flow nasal canula, invasive ventilation, surfactant therapy and management of various other complications of prematurity.
- Each neonate will be evaluated with septic screen, X- ray, ABG, shake test.

The neonates included in the study will be assessed from history examination history and investigations. The age of the mother is relevant as low maternal age and high maternal age are associated with complications during delivery leading to premature births , the parity and gestation of the mother will guide us the current status of mother obstetric history for the assessment. Expected date of the delivery will be calculated from the last menstrual period of the mother. Any new-born delivered less than 37 weeks of gestation is called as preterm babies the delivery is termed as preterm delivery for the prevention of respiratory distress syndrome in neonates frequent use of antenatal steroids are administered to neonates. multiple regimes are available for use of antenatal steroids. In our institute dexamethasone was used at 6hrs apart for 4 doses. The study will include important maternal factors such as

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

eclampsia and pre-eclampsia defined as hypertension, proteinuria with altered sensorium while hypertension and proteinuria respectively. The gestational diabetes will diagnosed on the estimation of blood sugar in the mother.a single value of more than 200mg/dl of blood sugar or fasting blood sugar more than 130mg/dl or hba1c levels more than 6.5 during antenatal period will be considered as gestational diabetes mellitus. If a preterm delivery is suspected pre term labour is avoided with the use of medications, like retoridine, nifedipine, magnesium sulphate, isoxsuprine, atosiban, and progesterone. The details of the ultrasonography will be noted. In the current study any newborn diagnosed case of respiratory distress syndrome irrespective of weight and gestational age will be included. All institutes will follow standard protocol for the management of RDSnewborn less than 27 weeks receive surfactant therapy just after the birth. And extubated. The CPAP is continued to maintain the saturation of more than 94% the repeat dose of surfactant dose was given after careful assessment by clinical examination and investigations. A(Sillverman Anderson score) was used dfor the assessment ofnewborns. SAS scores incorporates upper chest retractions, lower chest retractions, nasal flaring, respiratory rate and grunt. these signs are allotted 2 points each maximally for the clinical deterioration, a mild or normal pattern is indicated 0 points while some level of abnormality is given 1 mark . the maximum score is 10. Score more than 7 is severe RDS, score 6-7 is moderate RDS, where as a score 3-5 mild RDS .continuous and vigorous monitoring is required for the assessment of neonates with use of SAS score . other investigations like x-ray chest and arterial blood gas analysis helps to categorise the severity of rds. The x-ray of RDS described as white out lungs or ground glass appearance , the lung field appears opaque because of minimal or no air movement inside the air parenchyma. The lung fields are dense and the x-rays picture them as radio-opaque pictures, the radio opacity decreases as more and more air flow inside the lungs. That signify the level of surfactant and its activity to prevent the collapse of the alveoli the more the air in the lungs, less is the density of lungs. The x-ray picture changes from ground glass appearance to reticulo-granular pattern,heterogenous opacity over the lungs to bilateral aeriated ,radiolucent lung fields.

Arterial blood gas analysis is routinely advised to assess function of lungs. After the birth oxygen saturation reaches to more than 90% in 10 min. an ABG drawn after 10 min of birth should reveal ph of 7.4, oxygen saturation more than 90% at room air, partial pressure of oxygen 70-100mm of mercury , bicarbonates 22-28mmole/metre, and co2 in the range of 34-45mm of hg. If the newborn has respiratory distress and started on oxygen support the ventilatory status is assessed using ratio of partial pressure of oxygen and fraction of inspired o2. A ratio of more than 300 is expected normally, ratio range between 200-300 is labelled as mild inspiratory insufficiency while ratio less than 200 is moderate-severe insufficiency. Another measure of ventilatory efficiency is calculated by oxygen index in a mechanical ventilated newborn. Oxygenation index is calculated as product of mean air way pressure and fraction of inspired oxygen for each unit of partial pressure of oxygen is totally multiplied by 100. The oxygenation index is a significant marker of respiratory insufficiency as it take in to account the air way pressure and oxygen required to maintain the partial pressure of oxygen. the oxygen index less than 15 is for mild respiratory insufficiency,16-25 is moderate respiratory insufficiency, 26-40 indicates severe respiratory insufficiency, while more than 40 indicative of very severe respiratory insufficiency. oxygenation index measurement is an

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

invasive method to asses respiratory function, requires frequent arterial samples. But is a good predictor of hypoxemic respiratory failure. Oxygen saturation index is an another method , non-invasive and continuous monitoring method to asses lung ventilatory function, the pao2 is replaced by oxygen saturation by pulse oximetry. The cases of RDS will be given surfactant by "ENSURE" technique. If clinical and investigational assessment of newborn after surfactant therapy is suggestive of hypoxaemia, mechanical ventilation is started in appropriate individualized study.

STATISTICAL ANALYSIS:

Data will be entered into Microsoft Excel sheet and statistical analysis will be done. Relationship of various demographic, clinical characteristics and etiology with outcome will be evaluated employing Chi- square test, Fischer's exact test for categorical data and independent t test for continuous data with normal distribution.

Sample size calculation:

The Estimated hypothesized value for one sample comparision or proportion and alpha error of 0.5000 on a two sided analysis assumed. The power of the study kept at 0.9000, while the proportion in the population p assumed to be p=0.3000 with the alternative p value of p=0.5000. the current study estimated sample size 40 cases of neonates diagnosed as respiratory distress syndrome over period of 2 years

EXPECTED RESULTS:

The study will collect data on total number of cases of RDS, maternal factors, fetal factors and interventions required. Conclusion: the immediate and late complications of prematurity, the type of therapy required to improve the clinical deterioration in RDS will be noted. This will help in the management of RDS.

DISCUSSION:

The respiratory distress syndrome is due to the deficiency of surfactant, which is produced late in the gestation. Hence the neonates are born prematurely. The preterm delivery is due to maternal and fetal factors, this factors will be studied. The major limitation of the study will be a population arriving from a narrow geographical area. In the study of Alokumaret. al. found that hyaline membrane disease 28 in: 9.3% of cases of respiratory distress in newborn, there was 4505 cases of respiratory distress in the study when the mortality was considered in the study, the most common cause of death was respiratory distress syndrome.(3). There are many factors associated with respiratory distress syndrome in the neonates like eclampsia and preeclampsia and gestational diabetes mellitus. The infant of diabetic mothers had propensity to develop RDS even though at term gestation and normal weight or 2.3 times more chances of respiratory distress and RDS in such cases has been observed in the study while li y et. al .(2). Related studies were reported by Kadamet. al. (16) and Bajaj et. al.(17). Few of the related studies on neonates (18-20) and NICU cases (21-22) were reviewed.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 3419 - 3425
Received 15 December 2020; Accepted 05 January 2021.

REFERENCES:

[1] Cloherty,JohnP,Eichenwald,EricC,Stark,Ann R Adre J. du Plessis. Respiratory distress syndrome , Chapter 33,Manual of Neonatal Care, 8 th edition, Lippincott Williams & Wilkins 2008;6:436-445
[2] Li Y, Wang W, Zhang D: Maternal diabetes mellitus and risk of neonatal respiratory distress syndrome:a meta-analysis. *Actadiabetologica*2019:1–12.
[3] *Kumar A,Bhat BV. Epidemiology of respiratory distress of new borns. ind JPediatr 1996, 63, :1:93-98.*
[4] Singh M, Sud N, Arya L, Hingorani V. Impact of special care services on perinatal and neonatal outcome. Indian pediatr. 1978;15:225-30.
[5] Silverman W, Anderson D. Controlled clinical trial on effects of water mist on obstructive respiratory signs, death rate and necropsy findings among premature infants. Pediatr. 1956;17:1-4.
[6] Kumar A, Bhatnagar V. Respiratory distress in neonates. Indian J Pediatr. 2005;72: 425-8.
[7] Driscoll S, Smith C. Neonatal pulmonary disorders. PaediatrClin North Amer. 1962;9:325-52.
[8] Wood D, Downes J. A clinical score for a diagnosis of respiratory failure. Amer J Dis Child. 1972;123:227-9.
[9] Morrison J, Rennie J. Neonatal respiratory morbidity and mode of delivery at term: Influence of timing of elective caesarean section. Br J ObstelGynaecol. 1995;102:101-06.
[10] Lureti M. Risk factors for respiratory distress syndrome in newborn infants: A multi centre Italian survey. ActaObstetrGynecolScandinavica. 1993; 72: 359-64.
[11] Nagendra K, Wilson C. Incidence and etiology of respiratory distress in newborn. Medical J Armed Forces India. 1999;55:331-35.
[12] Derek C. Epidemiology of neonatal respiratory failure in the United States. Am J RespirCrit Care Med. 2001;164:1154- 60.
[13] Geller E, Wu J, Jannelli M. Neonatal outcome associated with planned vaginal verses primary caesarean delivery. J Perinatol. 2010;30: 258-64.
[14] Rubaltelli F, Bonafe L, Tangucci M. Epidemiology of Neonatal Acute Respiratory Disorders. Neonatol 1998;74:7-15.
[15] Dani C, Reali M, Bertini G. Risk factors for the development of respiratory distress syndrome and transient tachypnoea in newborn infants. European Respiratory J. 1999;14:155-9.
[16] Kadam, N., S. Acharya, S. Shukla, N. Raisinghani, and A. Khandekar. "Clinical Profile and Survival Outcome of Acute Respiratory Distress Syndrome in a Rural Tertiary Care Hospital." Journal of DattaMeghe Institute of Medical Sciences University 14, no. 3 (2019): 210–14. https://doi.org/10.4103/jdmimsu.jdmimsu_116_19.
[17] Bajaj, A., S. Kumar, A.H. Inamdar, and L. Agrawal. "Noninvasive Ventilation in Acute Hypoxic Respiratory Failure in Medical Intensive Care Unit: A Study in Rural Medical College." International Journal of Critical Illness and Injury Science 9, no. 1 (2019): 36–42. https://doi.org/10.4103/IJCIIS.IJCIIS_40_18.
[18] Patel, A.B., H. Kulkarni, K. Kurhe, A. Prakash, S. Bhargav, S. Parepalli, E.V. Fogleman, J.L. Moore, D.D. Wallace, and P.L. Hibberd. "Early Identification of Preterm Neonates at Birth with a Tablet App for the Simplified Gestational Age Score (T-SGAS) When Ultrasound Gestational Age Dating Is Unavailable: A Validation Study." PLoS ONE 15, no. 8 August (2020). https://doi.org/10.1371/journal.pone.0238315.
[19] Reddy, R., and A. Kher. "Outcome of Neonates Born to Mothers with Premature Rupture of Membranes." Sri Lanka Journal of Child Health 49, no. 3 (2020): 256–62. https://doi.org/10.4038/sljch.v49i3.9144.
[20] Taksande, A. "Estimation of Biomarkers in Asphyxiated Full Term Neonates with Special Reference to Serum Lactate Dehydrogenase, Aspartate Transaminase and Alanine Transaminase." Sri Lanka Journal of Child Health 49, no. 3 (2020): 306–7. https://doi.org/10.4038/sljch.v49i3.9157.
[21] Taksande, A., J. Vagha, and A.R. Rao. "'Is There Any Effect of Phototherapy on Cardiac Function in Neonates with Hyperbilirubinemia.'" European Journal of Molecular and Clinical Medicine 7, no. 2 (2020): 1967–76.
[22] Varma, A., R.J. Meshram, N. Darvhekar, Z. Patel, S.G. Damke, and A. Taksande. "Study of Clinical Profile of Neonatal Seizures in a NICU of Rural Central India." International Journal of Research in Pharmaceutical Sciences 11, no. 4 (2020): 5603–7. https://doi.org/10.26452/ijrps.v11i4.3198.