



EFFECTIVENESS OF SUPERVISED CHEST PHYSIOTHERAPY FOR NEONATES IN NICU WITH RESPIRATORY DISTRESS -A CASE REPORT

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INTRODUCTION

DS, or neonatal respiratory distress syndrome, is a common cause of breathing problems in newborns, especially premature babies. It is caused by a lack of surfactant in the lungs, which is essential for proper lung function. The severity of RDS is often linked to the baby's gestational age, with younger and more premature infants at higher risk. The cause of neonatal respiratory distress syndrome (RDS) is a surfactant deficit brought on by either insufficient surfactant synthesis or surfactant inactivation in the setting of developing lungs. Both of these variables are impacted by premature birth, which directly contributes to RDS. Surfactant is produced at around 20 weeks of fetal life by Type 2 alveolar cells.(1)

Among neonates born at full term, the incidence of RDS was 1.64. Earlier studies from India indicated higher incidence rates (4.2%).(2)

Newborns with RDS, often premature, show immediate respiratory distress after birth. They may have decreased respiratory sounds and peripheral pulses, along with cyanosis, poor perfusion, and signs of increased work of breathing like tachypnoea, grunting, nasal flaring, retractions, and use of accessory muscles. Auscultation reveals consistently decreased air entry.(1)

The application of chest physiotherapy in a case of RDS in infants and the evaluation of the outcomes were the goals of this case report.

CASE PRESENTATION

This report is reporting a male neonate who was born at 39 weeks gestation via LSCS delivery to 28-year-old gravida-1 and a para-1 woman. Birth weight was 4.1 kg, and Apgar scores were 7 and 8 at 1 and 5 minutes, respectively. Fetal growth was abnormal with respiratory distress, neonatal hyperbilirubinemia, and clinical sepsis. The baby cried after bag and mask and weighed 4.1 kg. The baby had RDS required oxygen support and neonatal hyperbilirubinemia required phototherapy and was admitted to NICU for 20 days in which PI was started from 11th day. On observation baby was alert and active, yellowish tinge to skin and eyes, chest retractions were seen, use of accessory muscles of respiration.

On general examination baby's vitals were HR-146/min, RR-46/min, Temp-36.7 degree Celsius and SpO₂-92%. On Auscultation S1 and S2 heart sounds present, murmur present, air entry bilaterally

reduced. Silverman Anderson score was 6/10 and Downes Score was 7/10 (indicate moderate respiratory distress). On CNS examination, the baby was alert, pupils were reactive to light bilaterally and all neonatal reflexes were normal.

The histopathology report reveals high erythrocyte count (6.98 million/cmm), iron deficiency anaemia (MCH 25.80 pg). Renal function test revealed high blood urea (197 mg/dl) and serum electrolytes revealed high amount of serum potassium (6.50 mEq/L). Total leucocytes count (WBC) was low (4180 /cmm). Liver function test revealed high total bilirubin (12.50 mg%), direct bilirubin (0.70 mg%), indirect bilirubin (11.80 mg/dl). ABG reports revealed that baby has metabolic acidosis. Based on these clinical findings and diagnostic assessment, the baby was diagnosed with RDS, neonatal sepsis and hyperbilirubinemia. Before commencing PI, the main diagnostic assessment involved was HR, SpO₂, RR and ABG reports, which was found to be 146/min, 46/min, 92% and metabolic acidosis, respectively.

Before initiation physiotherapy intervention, the goals and purpose of this case report was explained to baby's parents, and informed consent was received before planning any further treatment strategies. Following which supervised PI was initiated from 11th day of NICU stay. Physiotherapy regimen was performed for 5 days a week for 20 mins. On day 1 of PI positioning was given from supine to side lying along with chest PT involving mild percussions and vibrations were performed on overall lung field, segmental expansion was given for lateral segments and bilateral upper limb and lower limb PROM (passive range of motion) exercises. On day 2 and 3 along with positioning and chest PT and PROMs, diaphragmatic facilitation was performed. On day 4 and 5 prone positioning was given along with chest PT and segmental expansion for lateral as well as posterior basal segments AROMs. Rest all protocol was continued along with intercostal stretch and rib springing. On day 6 and 7 perioral stimulation was added along with the rest.

Parameters	Pre-treatment values	Post-treatment values
SpO ₂	92%	99%
Heart Rate	146/min	142/min
Respiratory Rate	46/min	42/min
ABG values	pH = 7.28 paCO ₂ = 26.1 paO ₂ = 66.1 HCO ₃ = 11.9 Metabolic Acidosis	pH = 7.36 paCO ₂ = 37.1 paO ₂ = 97 HCO ₃ = 23.02 Normal

DISCUSSION

This case report sheds light on importance of chest physiotherapy (CPT) in neonatal intensive care unit (NICU) with baby suffering from RDS, neonatal sepsis, hyperbilirubinemia. In the past decade, physiotherapy has become a standard part of care for newborn infants in neonatal intensive care units globally, particularly for those with respiratory issues.(3) According to one systematic review the use of various respiratory physiotherapy techniques showed beneficial outcomes in terms of SpO₂, RR, length of oxygen therapy, respiratory system compliance, chest radiological findings, and hospital stay duration.(4)

CPT along with other treatments such as O₂ administration, endotracheal intubation along with some medications such as surfactant replacement therapy, bronchodilators, diuretics, sedatives, and steroids. Along with this temperature control, proper nutrition and anaemia control plays an important role.(5) Previous studies support our case report that inferred, significant improvement in vitals post CPT. Diaphragmatic facilitation helps in contraction of diaphragm in neonates which results in closure of glottis to create a positive intra-thoracic pressure and aid in the distribution of air within the lungs, with the oesophageal pressure swinging up to -70 cm H₂O.(6)

Vitals such as SpO₂, HR, RR and ABG was considered as outcome measures as these are easy to use and are feasible. Precedent studies have considered similar outcome measures and their correlation

with respiratory functions. (4-5) Therefore, precise physiotherapeutic interventions result in decreased complications, mortality, and morbidity, as well as a more significant indication of lowering subsequent NICU stay.

CONCLUSION

This case report emphasizes the efficacy of supervised chest physiotherapy interventions in a NICU patient suffering from RDS, neonatal sepsis and hyperbilirubinemia. It helps in decreasing associated complications, mortality and morbidity and reduces the NICU stay. There is no substantial evidence shedding light on importance of physiotherapeutic intervention in such condition. Hence supervised PI showed significant improvement in vitals and ABG and thus reducing associated complications and NICU stay.

REFERENCES

1. Yadav S, Lee B, Kamity R. Neonatal Respiratory Distress Syndrome. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Mar 7]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK560779/>
2. Alfarwati TW, Alamri AA, Alshahrani MA, Al-Wassia H. Incidence, Risk factors and Outcome of Respiratory Distress Syndrome in Term Infants at Academic Centre, Jeddah, Saudi Arabia. *Med Arch*. 2019 Jun;73(3):183–6.
3. Bertone N. The Role of Physiotherapy in a Neonatal Intensive Care Unit. *Aust J Physiother*. 1988 Jan 1;34(1):27–34.
4. Igual Blasco A, Piñero Peñalver J, Fernández-Rego FJ, Torró-Ferrero G, Pérez-López J. Effects of Chest Physiotherapy in Preterm Infants with Respiratory Distress Syndrome: A Systematic Review. *Healthcare*. 2023 Apr 11;11(8):1091.
5. Mehrem E. Efficacy of Selected Chest Physical Therapy on Neonates with Respiratory Distress Syndrome. 2015 Jan 1;
6. Dassios T, Verveniotti A, Dimitriou G. Respiratory muscle function in the newborn: a narrative review. *Pediatr Res*. 2022 Mar;91(4):795–803.