



EFFECT OF LUNG SQUEEZING TECHNIQUE AND REFLEX ROLLING ON INFANTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME

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ABSTRACT

Acute respiratory distress syndrome is process of hypoxemic respiratory failure associated with pulmonary edema. Respiratory distress syndrome is the primary cause of neonatal mortality usually occurring in children of less than 36 weeks of gestation. Currently, in all hospital conventional chest physiotherapy is used as a supportive measure to treat infant with Respiratory distress syndrome. Twenty participants were recruited in a consecutive manner and allocated in two groups through odd even method Group A treated with Lung squeezing technique and conventional physiotherapy, Group B treated with reflex rolling along with conventional physiotherapy. All participants recruited through physician reference and screening according to selection criteria. Outcomes included was respiratory rate and oxygen saturation they were tested at baseline as a Pre test and post test measurements were taken after the treatment duration of 5 days. Demographic data were analyzed through statistical package for social science. Statistical analysis used was descriptive analysis to find mean and standard deviation. Both lung squeezing and reflex rolling technique were effective in reducing RR and improving SpO₂. Anyhow while comparing mean difference reflex rolling shows more improvement than lung squeezing technique.

KEYWORDS: Respiratory distress syndrome, lung squeezing technique, reflex rolling technique, Spo₂, Respiratory rate.



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INTRODUCTION

Respiratory distress syndrome (RDS) is a common condition in the neonates responsible for 30-40% of admissions in the neonatal period. Respiratory distress syndrome of the newborn is also called as hyaline membrane disease. It is regarded as breathing disorder of premature babies. It is most common in neonates younger than 36 weeks of gestation¹. Respiratory distress syndrome (RDS) affects about 1 percent of newborn infants and is the leading cause of death in premature babies.² Premature born infants are at a higher risk of developing disability and death. Premature infants develop wide variety of health problems that can occur before or after stay in Neonatal Intensive care unit (NICU) that includes respiratory distress syndrome, bronchopulmonary dysplasia, gastroesophageal reflux, anaemia, eye diseases, dental problems³, apnea, transient tachypnea, hypothermia, hypoglycemia, seizures and prolonged jaundice, feeding problems, weight loss. Premature infants require ventilator assistance or oxygen support, high medical care is to be provided in order to prevent neurodevelopment problems⁴. Premature infants who are most complex or with severe conditions are at a risk of long term neurodevelopment disorder⁵. These infants require a special care in NICU as they differ from healthy full term infants³. In healthy infants, the alveoli are small and air-exchanging sacs of the lungs are coated by surfactant, hence it helps the lungs to expand and recoil. If premature newborns have not produced enough surfactant in lungs it is either due to developmental insufficiency of surfactant production by the lungs or due to deficiency of gene mutation in one of the surfactant proteins hence, the newborn is unable to open the lungs fully to breathe². Deficiency in surfactant is more prone for lung collapse resulting in ventilation perfusion mismatch and severe hypoxemia⁶. First line of management for the neonates is to clear the airway, and ensure adequate breathing and circulation⁷. Chest physiotherapy is the treatment generally preferred and performed in NICU with an aim to remove excess of bronchial secretions and ensure oxygenation, treatment techniques for airway management includes Postural drainage, Percussion, Vibration, Positioning to improve ventilation/perfusion matching. Few newer techniques include prolonged slow expiratory technique, expiratory flow increased technique, Lung squeeze technique (LST) and Reflex rolling using Vojta therapy⁸. The lung squeezing technique (LST) provides small amplitude oscillatory chest wall compression performed on whole hemithorax that restores the homogeneous inflation of the lungs⁹. Vojta therapy is an isometric strengthening technique, encourages the normal movement pattern of respiration through tactile stimulation⁸. So the purpose of the study is to determine the effects of reflex rolling and lung squeezing technique in the management of respiratory rate and oxygen saturation in preterm infants with respiratory distress syndrome.

MATERIALS AND METHODS

Quasi experimental study was performed in 20 Neonates with 28-35 weeks of gestation admitted to

NICU with diagnosis of RDS were included in the study. Those neonates were hemodynamically stable, we made sure that No major airway interventions like manual hyperinflation or bronchial lavage performed in previous 12 hours, Neonates with respiratory and cardiac congenital anomalies, those with seizures, mechanically ventilated, acute stage of RDS, neonates who underwent surgical procedures, those with genetic syndromes, any segmental or lobar collapse confirmed on chest X-ray were excluded from the study. Study was performed at Saveetha Medical College Hospital, Ethical clearance obtained prior to initiation of the study. Information sheet was provided to the neonate's parents and treatment procedure was clearly explained and following which written informed consent was signed by parents. Participants were allocated into two groups using Consecutive sampling method. Group A and Group B. Group A: 10 RDS infants received Lung squeezing technique along with conventional chest physiotherapy. Group B: 10 RDS infants received Reflex rolling along with conventional chest physiotherapy. Following group allocation infants were assessed according to assessment sheet. The following data was obtained from the infant's charts and noted on a specific research protocol: birth weight, gestational age, APGAR, mode of delivery, disease. Following which infants were tested for outcomes Respiratory Rate (RR) is measured with the observation of the abdominal movement, and for one minute abdominal movement should be counted. Saturation of peripheral oxygen (SpO₂) was measured with the pediatric pulse oxymeter which is tied across the infant's wrist. These outcomes were tested before treatment as a pretest and repeated as a posttest after 5 days.

Group a: lung squeezing technique

Group A infants received lung squeezing technique along with conventional chest physiotherapy. Lung squeeze technique consists of 3-4 cumulative chest compressions lasting for 5 seconds, followed by a gentle low "release phase", with the chest wall completely released; the second compressions are performed successively for 5 minutes on one hemithorax, then 5 minutes on the other hemi thorax. The infant will be in supine position, and without body tilt, for a total of 10 minutes. Use both hands to perform the squeeze on one hemithorax at one time. Place One hand on the posterolateral aspect of the hemi thorax and the other hand covered the anterior chest extending from the lower ribs to above the clavicle of the infant. These techniques were performed in 2-3 sets of 4-5 repetitions for 5 days a week.

Group b: reflex rolling technique

Group B infants received reflex rolling technique along with conventional chest physical therapy. This maneuver includes a slight rotation of the head towards the side from which the stimulus is delivered. The starting position for performing the first phase of reflex rolling is the asymmetric supine position, with the limbs freely lying on the resting surface. A digit pressure will exert on the chest area, where the mammillary line crosses the insertion of the diaphragm, either at the level of the 6th rib, or between the 5th and the 6th, or between the 6th and the 7th. Each treatment consist in delivering four

stimuli, two to the left half of the chest (stimulations I and II) and two to the right half of the chest (stimulations III and IV). Each stimulus will be consisted of a slight pressure, progressively oriented in dorsal, medial and cranial directions, diagonally to the spine. The treatment was repeated three times a day, at time intervals of 0, 2 and 4 hours for five days consecutively. Conventional Chest Physical Therapy was given for both the groups it includes postural drainage, vibration, and percussion. Postural drainage was applied to infants by elevating head of the infant at 30 degree to prevent gastro esophageal reflex and aspiration. In neonates and infants 'tenting'(using the first three or four fingers of one hand with slight elevation of the middle finger). Chest percussion was given with motion from the wrist. Vibration of the chest was done manually by placing the fingers on the chest wall over the segment being drained and the wrist and the elbow remained immobile, isometrically contracting the muscles of the forearm and

hand to cause a vibratory motion. The procedure was performed for 5min. Chest percussion position lying down on the right side and on the left, with 5 min duration on each side. Following which the infant was turned to supine position and receive vibration of the anterior chest wall, bilaterally for a further 5 min.

RESULTS

The Statistical analysis was done using statistical package for social science (SPSS 16) for windows. The Statistical analysis used was Descriptive analysis to find mean and standard deviation. Inter group comparison for RR & SpO2 was analyzed by using parametric independent t-test. Intra group comparisons measured at baseline and after intervention were done with paired t-test. Significant difference were considered as significant at p<0.05.

Table 1
Comparison of RR between Group A and Group B

| Groups | Mean | | Standard Deviation | | P Value |
|---------|----------|-----------|--------------------|----------|---------|
| | Pre test | Post test | Pretest | Posttest | |
| Group A | 64.80 | 36.50 | 2.44 | 3.31 | 0.001 |
| Group B | 65.3 | 36.4 | 1.95 | 3.24 | |

Table 2
Comparison of SPO₂ between Group A and Group B

| Groups | Mean | | Standard Deviation | |
|---------|----------|-----------|--------------------|----------|
| | Pre test | Post test | Pretest | Posttest |
| Group A | 84.6 | 91.50 | 2.32 | 1.72 |
| Group B | 76.70 | 92.10 | 19.65 | 1.66 |

Figure 1
Comparison of pre and post test values of RR in Group A & Group B

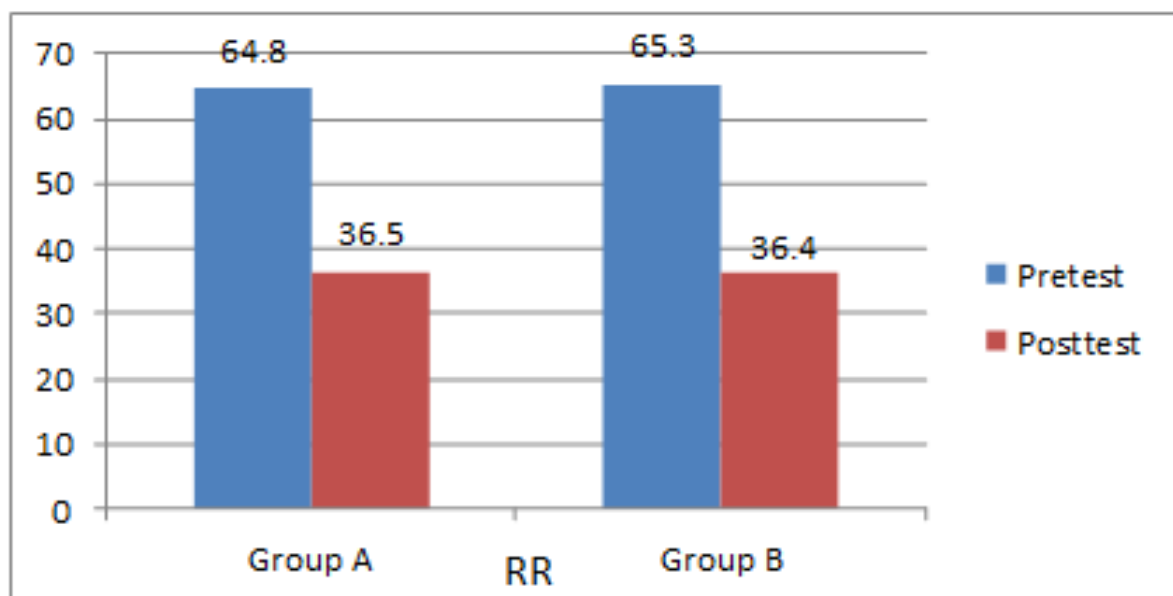
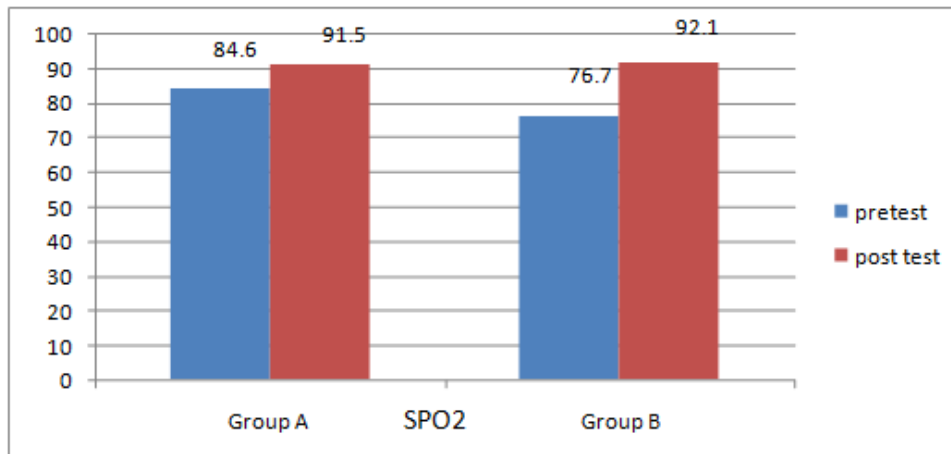


Figure 2
Comparison of pre and post test values of SPO₂ in Group A and Group B



Respiratory rate compared between 2 groups Group A and Group B, both the groups show mean value similar in pre test and they gradually reduced in post test. P value 0.001, shown in Table 1. Both the groups pre and post mean values of respiratory rate compared in Figure 1. Table 2 showed comparison of oxygen saturation between the groups. Pre test scores of group A is 84.6 which increased in post test to 91.5 and group B shows 76.7 in pretest which gradually increased to 92.1 in the post test. Both the groups pre and post mean values of oxygen saturation shown in figure 2.

DISCUSSION

Chandrika D Nayak stated that social factors like maternal age, education level, race, and socioeconomic status are associated with low birth weight and preterm births as it is contributing to insufficient access to prenatal care¹⁰. As premature birth being a major problem associated with respiratory diseases among infants our study focused to analyze the Effects of Reflex Rolling and Lung Squeezing Technique on saturation of peripheral oxygen (SpO₂), Respiratory Rate among Preterm Infants with Respiratory Distress Syndrome. In this Study 20 Respiratory Distress Syndrome preterm infants were taken. Among this 20, they were divided in two groups A and B. Group A with 10 RDS preterm infants received Lung squeezing technique with conventional chest physiotherapy & Group B with 10 RDS preterm infants received Reflex rolling with conventional chest physiotherapy. In this study two outcome measures SpO₂ and Respiratory rate were used. Comparison of pre and post test value of Group A and Group B was conducted respectively. After five days of intervention both group showed significant improvement in respiratory distress syndrome when compared to pre intervention measurement. However Reflex rolling group showed statistically significant, good improvement compared to Lung squeezing group after intervention. Rasha A. Mohamed concluded in their study that Chest Physiotherapy is effective and safe for mechanically ventilated Preterm Newborns with Respiratory Distress Syndrome¹¹. Lung squeeze technique was proved safe and effective for treating atelectasis. However Thamer alghalbi study

statement supporting our present study by suggesting that Lung Squeezing Technique & Vojta Method should be apply in clinical practice along with conventional chest physiotherapy¹². In his study these both techniques were given to preterm infants, whereas the present study was done on preterm infants with applying lung squeezing and reflex rolling technique. So it was supported that reflex rolling and lung squeezing technique were effective & safe in Preterm Infants¹². Lung squeezing technique known to improve respiratory system compliance and lung mechanics in preterm infants, it is suggested that lung squeezing can also be used as an intervention to enhance distribution of ventilation in mechanically ventilated respiratory distress syndrome infants¹³. Thereby, this study can be considered for further management of respiratory distress. We come across limitation of small sample size of study. Probably long term treatment can further provide better results and use of different outcome measures in future studies can be done. In Preterm neonates with Respiratory Distress Syndrome Respiratory rate is increased and saturation of peripheral oxygen (SpO₂%) decreases. Reflex Rolling and Lung Squeezing Technique both are effective in Reducing Respiratory rate and improving saturation of peripheral oxygen (SpO₂%) in Preterm neonates with Respiratory Distress Syndrome.

CONCLUSION

Hence, through this it has been concluded that both Reflex Rolling and Lung Squeezing Technique are safe and effective in improving saturation of peripheral oxygen (SpO₂) and reducing Respiratory Rate in preterm neonates with Respiratory Distress Syndrome though it has also been analyzed that reflex rolling shows more effective while comparing through mean values. Thereby present study result can be considered and suggested for clinical implementation.

CONFLICT OF INTERESTS

No Conflict of interest to declare

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