

To Study the Effect of Salbutamol in the Treatment of Transient Tachypnea of Newborn

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1. Introduction

Respiratory diseases are very common among newborns and transient tachypnea of the newborn (TTN) is one of the most common. TTN results in admission to a neonatal intensive care unit (NICU) for treatment of the reduction in the rate of lung fluid clearance after birth. A delay in lung fluid absorption in neonates disrupts the transition from intrauterine to extrauterine life.

In some newborns, TTN exacerbates to prolonged tachypnea, which may result in respiratory failure (hypoxia, respiratory fatigue, and acidosis) and the requirement for intubation and mechanical ventilation. Additionally, a very low number of such infants may develop air leakage from the lung as pneumothorax and pneumomediastinum. The risk of such complications is increased in patients undergoing continuous positive airway pressure therapy (CPAP) therapy. However some of these patients develop pulmonary hypertension, also called malignant TTN.

TTN is controlled via supportive treatment, hyperbaric oxygenation therapy, antibiotic therapy, and liquid therapy. In addition to the preservative treatments, the effect of lasix, epinephrine, inhaled salbutamol and limitation in fluid intake was assessed during TTN. Fetal catecholamines (adrenaline and glucocorticoids) are released through the stimulation of beta - adrenergic receptors in alveolar type 2 cells in response to labor stress. Such conditions result in an increase in epithelial sodium channel and sodium - potassium triphosphates (Na - K - ATPase) pumps on the surface of the membrane and consequently, the respiratory active mode transits from the secretion of chloride and liquids to the reabsorption of sodium. Infant lungs are unable to transition the respiratory - mode from secretion to reabsorption of liquids; in addition, lung immaturity in the expression of sodium channels on the surface of epithelial cells can play a remarkable role in the incidence of TTN. Stimulation of beta - adrenergic receptors by beta - adrenergic agonists, such as salbutamol, is effective in increasing the activity of epithelial sodium channels and Na - K - ATPase pumps. Different studies have investigated patients with TTN focusing on the effects of both oral and injection furosemide, inhaled epinephrine, and an inhaled beta2 antagonist (salbutamol). They reported inefficiency of epinephrine and furosemide on the duration of TTN. In addition, use of salbutamol as a standard treatment needs more investigation. Hence, since TTN is a self - limiting disease and one of the most common respiratory complications in newborns, more targeted investigations are required to reduce the duration of the disease. The current study aimed at evaluating the effects of inhaled salbutamol on the clinical process of TTN.

Aims and objectives:

- To study the effect of salbutamol in the treatment of ttnb.
- Since salbutamol is short acting and is given in a nebulised form where the required dosage is minimal causing less systemic absorption and the possible adverse effects can be minimised.
- The babies are assessed before and after nebulization babies who don't show response with the first nebulization were given a second nebulization.

2. Materials and Methods

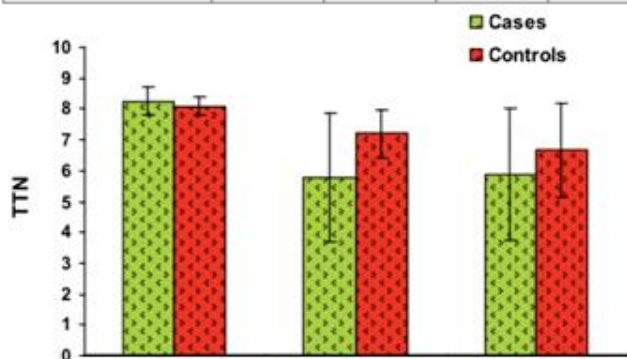
This is a prospective double blinded case control study, study included 69 study subjects where the neonates were allocated into cases and controls, study is done at GSL medical college and general hospital, Rajahmundry, during August 2021 to June 2022.

The following symptoms were assessed in all patients with TTN based on the clinical and paraclinical criteria of TTN: the incidence of tachypnea (RR > 60) within the first 6 hrs of birth and the CXR index, including at least one of the following symptoms: congestion of central lung vessels, thickening of the interlobar fissures due to high altitude pulmonary edema, symmetrical hilar congestion, hyperaeration, flattening of the diaphragm or an increased posteroanterior chest diameter or both. The exclusion criteria were the need for mechanical ventilation during the study, congenital malformation, perinatal asphyxia, hypocalcemia, confirmed systemic infection (positive blood culture), meconium aspiration, respiratory distress syndrome (based on radiographs), intrauterine growth retardation, history of fetal distress, pneumonitis, congenital heart disease, disseminated intravascular coagulation (DIC), multi - organ failure, hypoxemia, hypoglycemia, and polycythemia.

3. Results

In cases with first nebulization, the average decrease in TTN score is 2.48, when compared with 0.90 of the controls. Here 15 babies in a total of 39 cases responded with one dose of nebulization. Babies who did not respond to first nebulization received second nebulization, of 24 babies in control group, 10 babies responded to second nebulization, and the average decrease in TTN score is 2.45 in study group, when compared to 1.43 in control group

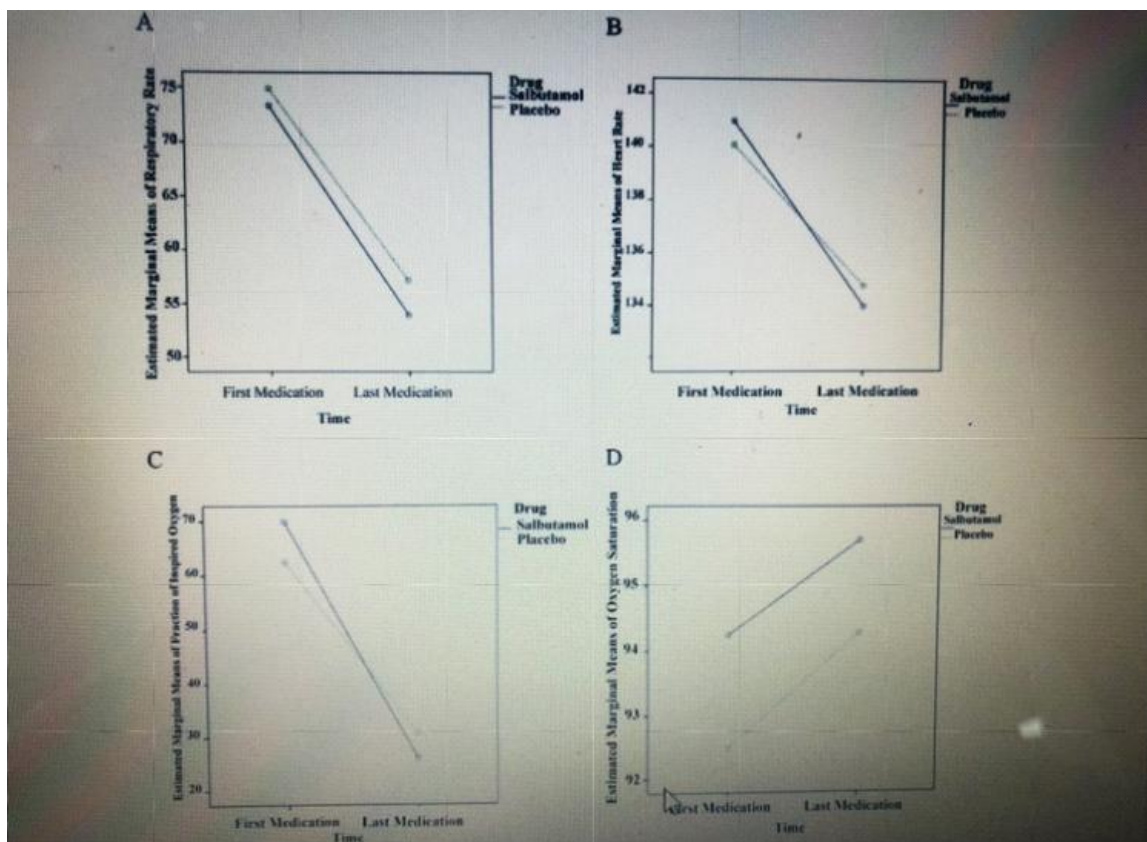
TTN	Cases	Controls	Total	P value
At birth	8.26±0.44	8.10±0.31	8.19±0.39	0.102
At first Neb	5.77±2.07	7.20±0.76	6.39±1.78	0.001**
At second Neb	5.88±2.15	6.67±1.52	6.31±1.85	0.119
Difference from at Birth				
• At first Neb	2.48	0.90	1.79	-
• At second Neb	2.45	1.43	1.89	-
P value from at birth				
• At first Neb	<0.001**	<0.001**	<0.001**	-
• At second Neb	<0.001**	<0.001**	<0.001**	-



4. Discussions

TTN causes a delay in lung fluid absorption and cannot be easily distinguished from other neonatal respiratory complications. Hence, due to the time - consuming diagnostic process, newborns who develop TTN symptoms should be treated to prevent complications.

The routine treatments included liquid therapy, antibiotic therapy, oxygen therapy, and supportive treatments. Other potential treatments relied on the physiology of normal clearance of lung fluid and other therapeutic challenges were conducted to accelerate the absorption of lung fluid. Antibiotic therapy and fluid therapy doses were increased if the treatment procedure and duration of hospitalization was prolonged.



The duration of hospitalization in the treatment group was shorter than that of the control group in the current study, and the difference between the groups was significant. It seems that the positive effect of salbutamol on the reduction of tachypnea severity and the need for oxygen therapy shortened the duration of hospitalization. In addition, a similar study conducted in Turkey also showed a significant difference between the treatment and control groups

regarding the duration of hospitalization. Another study in Korea also indicated shorter hospitalization in the treatment group, compared with the control group, although the difference was not significant.

5. Conclusion

The study showed that there is clinical improvement,

decrease in respiratory support and duration of hospital stay in babies who received salbutamol nebulization, when compared to the control group, without causing any adverse effects.

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