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Novel Low-cost Bubble CPAP as an Alternative Non-invasive Oxygen Therapy for Newborn Infants with Respiratory Distress Syndrome in a Tertiary Level Neonatal Intensive Care Unit in the Philippines: A Single Blind Randomized Controlled Trial

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Abstract : Background and Objective: Respiratory Distress Syndrome (RDS) among premature infants is a major causes of neonatal death. The use of Continuous Positive Airway Pressure (CPAP) has become a standard of care for preterm newborns with RDS hence cost-effective innovations are needed. This study compared a novel low-cost Bubble CPAP (bCPAP) device to ventilator driven CPAP in the treatment of RDS. Methods: This is a single-blind, randomized controlled trial done on May 2022 to October 2022 in a Level III Neonatal Intensive Care Unit in the Philippines. Preterm newborns (<36 weeks) with RDS were randomized to receive Vayu bCPAP device or Ventilator-derived CPAP. Arterial Blood Gases, Oxygen Saturation, administration of surfactant, and CPAP failure rates were measured. Results: Seventy preterm newborns were included. No differences were observed between the Ventilator driven CPAP and Vayu bCPAP on the PaO2 (97.51mmHg vs 97.37mmHg), So2 (97.08% vs 95.60%) levels, amount of surfactant administered between groups. There were no observed differences in CPAP failure rates between Vayu bPCAP ($\bar{x}$ 3.23 days) and ventilator-driven CPAP ($\bar{x}$ 2.98 days). However, a significant difference was noted on the CO2 level (40.32mmHg vs 50.70mmHg), which was higher among those hooked to Ventilator-driven CPAP (p 0.004). Conclusion: This study has shown that the novel low-cost bubble CPAP (Vayu bCPAP) can be used as an efficacious alternate non invasive oxygen therapy among preterm neonates with RDS, although the CO2 levels were higher among those hooked to ventilator driven CPAP, other outcome parameters measured showed that both devices are comparable. Recommendation: A multi-center or national study to account for geographic region, which may alter the outcomes of patients connected to different ventilatory support. Cost comparison between devices is also suggested. A mixed-method research assessing the experiences of health care professionals in assembling and utilizing the gadget is a second consideration.

Keywords : bubble CPAP, ventilator-derived CPAP; infant, premature, respiratory distress syndrome
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