

## Original Research Article

# IMPACT OF BODY POSITIONS ON CARDIORESPIRATORY STABILITY IN PRETERM NEONATES

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**ABSTRACT**

**Background:** Prematurely born neonates faces various physiological challenges due to poor cardiorespiratory systems. Body positioning influences the cardiorespiratory stability hence position in which a neonate is placed can directly affect lung mechanics, oxygenation & cardiorespiratory stability.

**Objective:** To determine the effect of different body position on the cardiorespiratory stability in preterm and low birth weight neonates.

**Materials and Methods:** This cross sectional observational study was conducted on 82 preterm [28-33+6 weeks] neonates in Newborn Care Unit, Kamla Raja Hospital. All enrolled neonates were placed in 5 study position for 120 minutes each with resting phase of 10 minutes. Heart rate and respiratory rate were measured for 60 seconds, measured BP in neonates using the correct cuff size on a calm, supine infant with a noninvasive monitor, measured neonatal temperature by placing a skin probe on clean, dry skin ensuring proper probe contact, SpO<sub>2</sub> by using pulse oximeter and vomiting was assessed by clinical observation. Primary outcome assessed were heart rate, respiratory rate, blood pressure and SpO<sub>2</sub>, secondary outcomes were body temperature and vomiting.

**Results:** This study revealed a statistically significant difference in heart rate, respiratory rate, and SpO<sub>2</sub> levels across the various positions ( $p < 0.001$ ). However, changes in blood pressure and temperature were found to be statistically insignificant ( $p > 0.005$ ). Vomiting was least prevalent in the left lateral position (15.9%) and the prone position (13.4%). In contrast, it was most frequent in the right lateral position (43.9%).

**Conclusion:** Prone position provides the best cardiorespiratory stability for preterm, LBW neonates. However, there were no significant changes in temperature or blood pressure across the five body positions. Vomiting was observed to be least frequent in the left lateral and prone position.

**Keywords:** Body positioning, Preterm neonates, Low birth weight infant, Cardiorespiratory stability, Special Newborn Care Unit

**INTRODUCTION**

Preterm and low birth weight (LBW) neonates are particularly vulnerable to various complications due to their immature physiological systems. One of the major concerns in neonatal care is maintaining cardiorespiratory stability. The position in which these neonates are placed plays a critical role in their

cardiorespiratory stability, as it can influence respiratory mechanics, oxygenation, and heart rate. In a Special Newborn Care Unit (SNCU), optimizing the care of preterm and LBW babies is vital to improving their survival and long-term outcomes. Various studies have explored how different body positions—such as supine, prone, and lateral—affect the cardiorespiratory stability of these neonates.

Blencowe H. et al,<sup>[1]</sup> assesses the role of different positions (prone, supine, lateral) in the management of preterm infant respiratory and cardiovascular stability, particularly in the neonatal intensive care unit (NICU). It highlights the benefits of prone positioning in improving oxygen saturation and reducing heart rate variability. Understanding the impact of body positioning on vital parameters like oxygen saturation (SpO<sub>2</sub>), respiratory rate, heart rate, and blood pressure is essential for guiding clinical practices aimed at reducing respiratory distress and promoting effective ventilation. Studies have shown that body positioning can significantly influence cardiorespiratory stability in preterm and low birth weight neonates. Sakashita et al,<sup>[2]</sup> found that prone positioning improved oxygenation and reduced apnea episodes, likely due to enhanced lung function. Similarly, Hassani et al,<sup>[3]</sup> observed that lateral positioning stabilized heart rate and respiratory rate in LBW neonates, suggesting cardiovascular benefits. Similar study done by Iodice et al,<sup>[4]</sup> which concluded that prone positioning was associated with more stable oxygen levels and fewer episodes of desaturation, likely due to improved respiratory mechanics and diaphragm support in this position, suggesting that prone positioning could be advantageous for respiratory stability in certain preterm neonates. This study aims to assess the effect of body positioning on cardiorespiratory parameters in preterm and low birth weight babies admitted to the SNCU. The findings could help inform clinical decisions about optimal positioning strategies to support the immature physiological systems of these neonates, improving their chances of survival and growth.

### Aims and Objectives

#### Aim

- To determine the effect of different body positions on cardiorespiratory stability of preterm and LBW neonates admitted in Special Newborn Care Unit.

#### Objectives

##### Primary objective

- To determine the effect of different body position on Heart rate, Respiratory rate parameters of preterm and low birth weight neonates admitted in Special Newborn Care Unit.
- To determine to effect of different body position on SpO<sub>2</sub> parameter of preterm low birthweight neonates admitted in Special Newborn Care Unit.

##### Secondary objective

- To determine the effect of different body position on temperature.
- To determine the effect of different body position on vomiting in preterm and low birth weight neonates.

## MATERIALS AND METHODS

**Study Design:** Single centre, Hospital based cross – sectional observational study.

**Setting:** Department of Paediatrics, a tertiary care centre

**Study period:** 2 year

**Sample size:** The sample size was calculated based on the study by Hajiahmadi M et al. (2016), which reported a mean heart rate of  $148.15 \pm 18.46$  beats/min in very low birth weight neonates in the supine position. Using the formula:

$$n = \frac{Z^2_{\alpha/2} \delta^2}{d^2}$$

$$\frac{(1.96)^2 \times (18.46)^2}{(4)^2} = 81.81$$

Sample size = 82

Considering an anticipated dropout rate of approximately 20% due to early discharge, clinical instability, referral, or withdrawal during the study period, a total of 100 neonates were initially enrolled to ensure that at least 82 neonates completed the study and were available for final analysis.

#### Inclusion Criteria

- Neonates with gestational age (28-33+6 weeks).
- Weight of neonate between 999-2499 gm.
- Spontaneously breathing neonates with stable cardiorespiratory parameters.
- Neonates on feeding (katori spoon/orogastric tube/gavage).

#### Exclusion Criteria

- Neonates with weight < 1000 gm and >2500 gms.
- Neonates with gestational week < 28 weeks and > 34 weeks.
- Neonates with respiratory distress or apnea of prematurity.
- Neonates on ventilator.
- Neonates on inotropic support.
- Neonates with any comorbidities.
- Neonates with congenital anomalies.

**Sampling technique:** Simple random sampling technique

#### Methods

- This cross sectional observational study was conducted in Special Newborn Care Unit, Kamla Raja Hospital after taking approval from institute ethical committee.
- After taking consent from parents, all neonates who fulfill the inclusion criteria were enrolled to study.
- Each neonates was kept in different study position for 120 minutes each with resting phase of 10 minutes in between.
- Study position are
  1. Supine position with horizontal head position

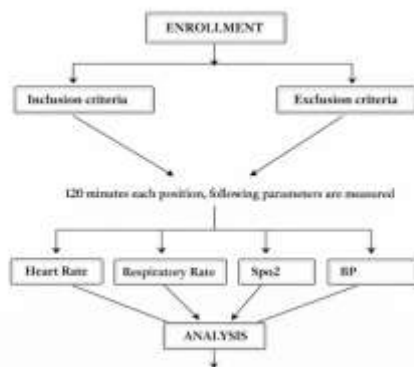
2. Prone position with turning head right or left sides.
3. Right lateral position
4. Left lateral position
5. Supine position with 30o head elevated with stable frame and gel pillow for stability of head.

### Data Collection

- Demographic profile: gestation age, sex, birth weight, residence.
- All mentioned parameters were recorded for every 15 minutes.
- Parameters: heart rate, respiratory rate, blood pressure, SpO2 and temperature were recorded. Maximum and minimum value was obtained for each parameter and mean was calculated.
- All parameters were recorded by primary investigator and routine neonatal care was conducted by SNCU staff as per their protocol.

### Outcome measures

Primary outcome- Hear rate, Reparatory rate, SpO2 and Blood pressure. Secondary outcome- Temperature, Vomiting.



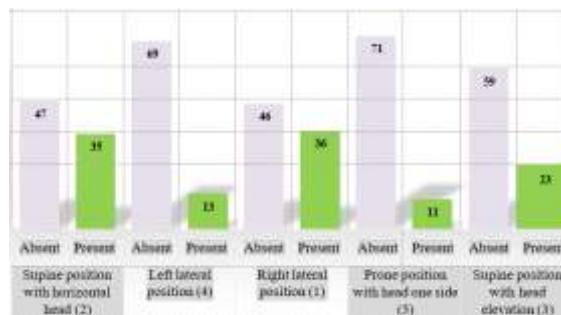
**Statistical Analysis:** Data analysis was done using Microsoft excel 2024-25 and SPSS 22 software Analysis includes descriptive and inferential statistics.

- **Descriptive statistics** included calculation of mean, SD, frequency and percentage
- **Inferential statistics** includes Repeated measure ANOVA and paired t test p values below 5% ( $p < 0.05$ ) considered statistically significant

## RESULTS

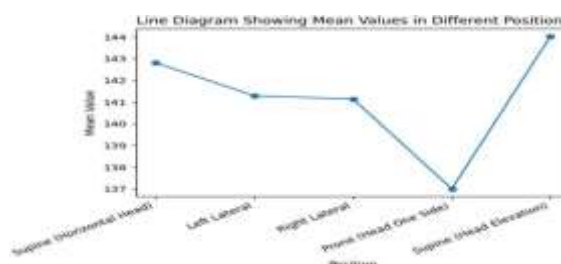
### Demographic details of cases

Among the 82 cases studied, males constituted 57.3% ( $n = 47$ ) while females accounted for 42.7% ( $n = 35$ ). The majority of neonates (81.7%,  $n = 67$ ) had a gestational age between 32 and 33 weeks + 6 days, whereas 18.3% ( $n = 15$ ) were between 28 and 31 weeks + 6 days. With respect to birth weight, 67.1% ( $n = 55$ ) weighed between 1500 and 2499 g, and 32.9% ( $n = 27$ ) had a birth weight between 999 and 1499 g.



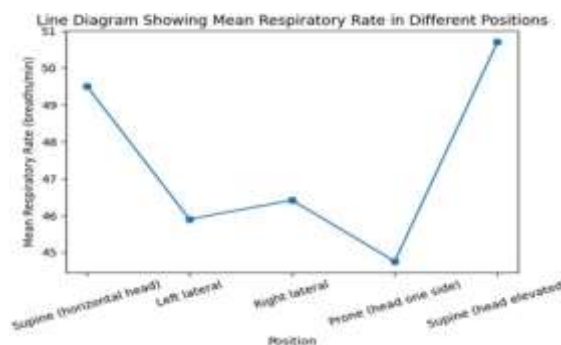
**Graph 1: Vomiting across different position**

Vomiting is least prevalent in the left lateral (15.9%) and prone (13.4%) position. It is more prevalent in the right lateral position (43.9%) and supine position with horizontal head (42.7%).



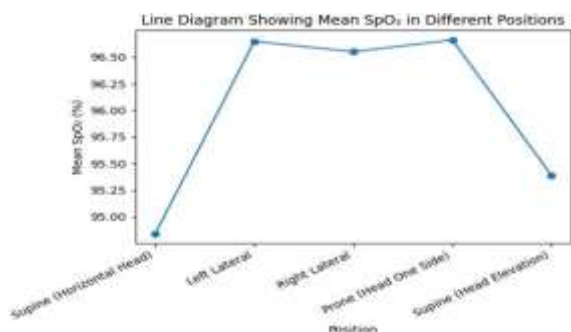
**Graph 2: Comparison of heart rate at different positions**

The graph demonstrates that heart rate significantly decreases in prone position compared to other positions ( $p < 0.05$ ). The supine position with a horizontal head shows relatively minor differences when compared to lateral positions. Overall, prone position have the most notable effect on lowering heart rate.



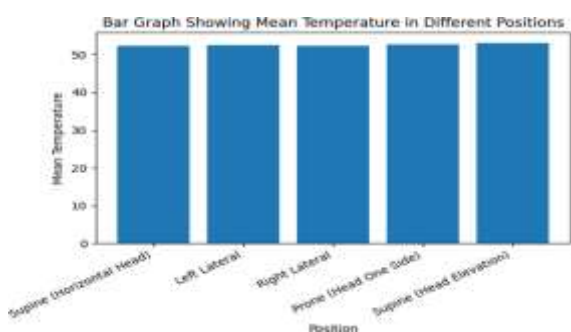
**Graph 3: Comparison of respiratory rate at different position**

Respiratory rate lower in prone position when compared to supine and lateral positions. Prone positioning consistently results in the lowest respiratory rates, supporting its effectiveness for better respiratory outcomes.

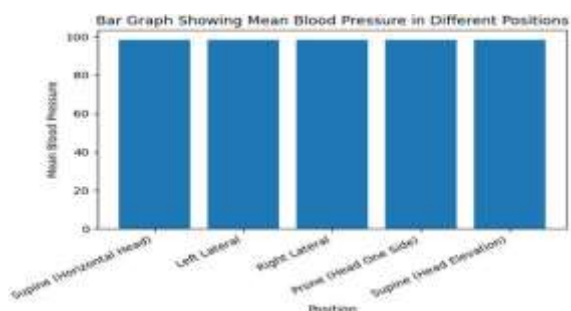


**Graph 4: Comparison of SpO2 at different position**

Prone positioning improves SpO2 levels significantly compared to supine and lateral positions, with p-values < 0.001.



**Graph 5: Comparison of blood pressure and temperature at different positions**



There is no significant differences across all body positions for temperature and Blood pressure.

## DISCUSSION

Present study was done to evaluate the cardio-respiratory stability in different body positioning among preterm and LBW neonates. It was showed that prone position consistently offered advantages in stabilizing heart rate, respiratory rate and spo2 levels, followed by lateral position and supine position, which was similar to study by Babuyeh T et al,<sup>[5]</sup> which suggests that ranges of fluctuations in heart rate are slightly less in the prone position compared to other positions. Study done by Mohamed et al,<sup>[6]</sup> showed that the mean values of heart rate were 142.2±17.3 b/min in right lateral position, 142.4±16.4 b/min in left lateral position and declined to 137.9±11.5 b/min in prone position with a statistical significant difference between the three

positions (p=0.012), It was also similar to Beşiktaş S et al,<sup>[7]</sup> showed that the mean heart rate of preterm newborns in prone was significantly lower than in in the supine position (F=9.92, p=0.002), it matches to study results by Mohamed et al<sup>6</sup> which showed that mean values of respiratory rate were 50.7±7.6 c/min in right lateral position, 50.4±7.8 c/min in left lateral position and declined to 46.6±4.0 c/min in prone position. There was a statistical significant difference between the three positions (p=0.001), this was similar to study done by Babuyeh T et al<sup>5</sup> where the SpO2 fluctuation in the prone position was significantly better than other positions (p<0.001). Study done by Mohamed et al<sup>6</sup> showed that the mean values of oxygen saturation were 94.7±5.6 in right lateral position, 94.9±5.9 in left lateral position and increased to 97.7±4.4 in prone position. A statistical significant difference was found between the three positions (p<0.001), but contrast to our study results by Punthmatharith B et al,<sup>[8]</sup> revealed normal ranges with no significant differences of the means of respiration rate, heart rate, and oxygen saturation among infants placed in the four positions before, immediately after, and after feeding. According to our study result changing body positions does not have a meaningful effect on body temperature but study by Saadati et al,<sup>[9]</sup> A found that body temperature was significantly reduced in the prone position whereas mean temperature in the supine position was significantly higher compared to the prone position. In our study Gastro esophageal reflex was more in right lateral and supine position and it was least in prone and left lateral position similarly Corvaglia L et al,<sup>[10]</sup> study showed that there were fewer vomiting episodes when infants were placed in the Left lateral and prone positions compared with the Right lateral and Supine positions. Kondo et al,<sup>[11]</sup> explored the effects of lateral versus supine positioning on the incidence of bradycardia and apnoea in very low birth weight infants, which indicated that lateral positioning reduced the frequency of bradycardia episodes, supporting its potential use in enhancing cardiovascular stability. Similarly, study done by Silva YG et al,<sup>[12]</sup> concluded the significant association between prone position and improvement in lung compliance to minimize respiratory effort.

## CONCLUSION

**This study concluded that**

- Prone and lateral positions offer better cardiorespiratory stability to preterm neonates compared to supine position.
- Prone and left lateral position effectively reduce vomiting in preterm and LBW infants, offering a beneficial non-pharmacological management option.

- There is no significant differences across all body positions for temperature and Blood pressure.

**Recommendations:** Neonatal units should consider incorporating prone and left lateral positioning into standard nursing care protocols for preterm and low birth weight infants, particularly during post-feed periods, to enhance cardiorespiratory stability and minimize regurgitation, under strict supervision and monitoring.

## REFERENCES

1. Jani PR, Lowe K, Perdomo A, Wakefield L, Hinder M, Galea C, Goyen TA, Halliday R, Waters KA, Badawi N, Tracy M. Cerebral oxygenation and perfusion when positioning preterm infants: clinical implications. *The Journal of Pediatrics*. 2021 Aug 1;235:75-82.11
2. Sakashita K, Kondo A, Morimoto K, Nakagawa T, Miyamoto S. Effect of prone position on respiratory status in preterm infants with apnea. *PediatrPulmonol*. 2018;53(12):1694-1699.
3. Hassani F, Khosravi N, AzizzadehForouzi M. Effects of body positioning on heart rate and oxygen saturation in low birth weight infants: A randomized controlled trial. *Iran J Pediatr*. 2020;30(2):e100813.
4. Iodice F, La Gamma EF, Plett KL, Chan RK. Supine vs. prone positioning: effect on oxygen saturation and heart rate variability in preterm infants. *Pediatr Pulmonol*. 2019;54(3):374–81.
5. Babuyeh T, Farhadi R, Zahed Pasha Y, HaghshenasMojaveri M. The impacts of prone position on the blood oxygen saturations and heart rates of preterm infants under mechanical ventilation. *Caspian J Pediatr Sep* 2018; 4(2): 298-302.
6. Mohamed, Fouda N, Mokbel M, Rodaina. (Effect of Lateral Positions versus Prone Position on Cardiorespiratory Parameters among Preterm Neonates with Respiratory Distress Syndrome. *Egyptian Journal of Health Care* 2020;11:609-621.
7. Beşiktaş S, Efe E. Effect of Position Priority on Physiological Variables in Preterm Newborns Receiving Respiratory Support: Randomized Controlled Trial. *Bezmialem Science* 2022;10(5):587-95
8. Punthmatharith B, Mora J. Effects of Positioning on Respiration Rate, Heart Rate, and Oxygen Saturation in Preterm Infants During Feeding: A Cross-over Design. *Pacific Rim Int J Nurs Res* 2018; 22(3) 187-199.
9. Saadati A, Iranikhah A, Fotokian Z, KhosraviSh, Asayesh H, Abbasi M, et al. The Effectiveness of Prone and Supine Positions on Body Temperature of Premature Neonates Admitted to Neonatal Intensive Care Unit. *Int J Pediatr* 2021; 9(2): 12989-998.
10. Corvaglia L, Rotatori R, Ferlini M, Aceti A, Ancora G, Faldella G. The effect of body positioning on vomiting in premature infants: evaluation by combined impedance and pH monitoring. *J Pediatr*. 2007 Dec;151(6):591-6, 596.
11. Kondo M, Hashimoto M, Saito K, Takahashi Y. The impact of lateral and supine positioning on bradycardia and apnea episodes in very low birth weight infants. *Neonatology*. 2021;118(2):162–8.
12. Silva YG, de Souza AA, Rebeiro JD, Almeida MB. The impact of supine versus prone positioning on respiratory mechanics and oxygenation in very low birth weight infants. *Braz J Med Bioz Res*. 2019;52(7):e8324.