Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 24s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Oxygen Saturation Variation During and After Breastfeeding in Stable Term Neonates During First 48 Hours of Life: A Cross-Sectional Study

Dr. Sathi Sri Naga Sai Pravallika Deepthi[1], Dr. Karthik.S[2], Dr. Sudha Reddy. V.R[*3]

[1]Junior Resident, Department of paediatrics, Sri Devaraj URS Medical College, Sri Devaraj URS Academy of Higher Education and Research, Kolar – 563103

Email ID: deepu1997deepthi@gmail.com

[2]Assistant professor, Deparment of Paediatrics, Sri Devaraj URS Medical College, Sri Devaraj URS Academy of Higher Education and Research, Kolar – 563103

Email ID: sk.karthik.1508@gmail.com

[3]Hod & Professor, Deparment of Paediatrics, Sri Devaraj URS Medical College, Sri Devaraj URS Academy of Higher Education and Research, Kolar – 563103

Email ID: dr.sudhareddy77@gmail.com

***Corresponding Author:**

Dr. Sudha Reddy. V.R

Hod & Professor, Deparment of Paediatrics, Sri Devaraj URS Medical College, Sri Devaraj URS Academy of Higher Education and Research, Kolar – 563103

Email ID: dr.sudhareddy77@gmail.com

.Cite this paper as: Dr. Sathi Sri Naga Sai Pravallika Deepthi, Dr. Karthik.S, Dr. Sudha Reddy. V.R, (2025) Oxygen Saturation Variation During and After Breastfeeding in Stable Term Neonates During First 48 Hours of Life: A Cross-Sectional Study. *Journal of Neonatal Surgery*, 14 (24s), 48-51

ABSTRACT

Background: Breastfeeding involves complex coordination of sucking, swallowing, and breathing. While oxygen desaturation during feeding is well-documented in preterm neonates, it remains underexplored in healthy term neonates. This study evaluates SpO_2 variations during and after breastfeeding in stable term neonates during the first 48 hours of life. **Material and Methods:** A hospital-based cross-sectional study was conducted in the postnatal wards of R.L. Jalappa Hospital over 3 months. The study included 50 term neonates (gestational age ≥37 weeks) who were hemodynamically stable and exclusively breastfed during the first 48 hours. SpO_2 was measured before, during, and after breastfeeding at 12, 24, 36, and 48 hours. Data were analysed using SPSS version22.0,with statistical significance set at $p < 0.05$.

Results: The mean birth weight of the neonates was 3.03 ± 0.37 kg, and the mean gestational age was 39 weeks. At 12 hours, a significant decrease in SpO_2 was observed during breastfeeding (95.66% to 94.84%) with partial recovery post-feeding (95.12%). A similar trend was observed at 48 hours, where SpO_2 decreased by 0.71% during breastfeeding and recovered post-feeding. Statistically significant differences in SpO_2 were found at 12 and 48 hours ($p < 0.05$). These fluctuations were small but significant and fell within the normal physiological range.

Conclusion: Minor fluctuations in SpO_2 during breastfeeding are normal physiological responses in term neonates, likely due to transient changes in respiratory patterns and oxygen demand during feeding. The study suggests that monitoring SpO_2 levels during the first 48 hours could serve as a standardized tool to assess feeding difficulties and help identify neonates who may require further evaluation or intervention.

Keywords: *Saturation, neonates, breastfeeding, SpO_2, pulse oximetry, respiratory, feeding, desaturation..*

1. INTRODUCTION

Breastfeeding is a critical component of neonatal care, providing essential nutrients, enhancing immune defence, and promoting neurodevelopment. [1] Effective breastfeeding relies on the synchronized coordination of sucking, swallowing, and breathing, which typically matures between 34 and 36 weeks of gestation.[2] While feeding-related desaturation and bradycardia have been well-documented in preterm neonates, such physiological fluctuations are often underestimated in healthy term neonates.[3]

Pulse oximetry is a non-invasive, sensitive, and reliable method for detecting transient fluctuations in oxygen saturation (SpO_2), especially during physiological stress such as feeding. [4] Oxygen desaturation episodes during feeding may be caused by transient airway obstruction, immature central coordination, or reduced respiratory effort due to fatigue. [5] The first 48 hours of life constitute a critical period of physiological adaptation for term neonates involving circulatory transition, establishment of functional residual capacity, and closure of fetal shunts such as the ductus arteriosus.[6]

Although pulse oximetry is routinely used for monitoring high-risk neonates, there is a paucity of literature focusing on oxygen saturation variability during breastfeeding in stable term neonates. A study by Geddes et al. highlighted that breastfeeding may lead to detectable fluctuations in SpO_2 and coordination of suck-swallow-breathe mechanisms even in term infants.[7]

This study aims to evaluate the variation in oxygen saturation during and after breastfeeding in stable term neonates during the first 48 hours of life.

2. MATERIAL AND METHODS

This was a hospital-based cross-sectional study conducted in the postnatal wards in R.L Jalappa Hospital, a tertiary care centre, over 3 months. The study was approved by the Institutional Ethics Committee of R.L. Jalappa Hospital. Written informed consent was obtained from all parents or legal guardians before the enrolment for study. Term neonates (gestational age ≥37 weeks) who were hemodynamically stable and exclusively breastfed during the first 48 hours of life were included in the study. Neonates were enrolled consecutively based on availability and parental consent.

Inclusion Criteria were hemodynamically stable term, appropriate for gestational age neonates born during the study period, admitted in the postnatal ward with baseline saturation of 94% and above. Exclusion Criteria were low birth weight, Sick or unstable neonates, babies with mothers having breast, nipple problems, Babies having gross congenital anomalies that can affect feeding, and babies having cardiovascular anomalies in the anomaly scan.

The sample size was calculated based on a previous study by Sana Niaz et al., which reported mean oxygen saturation during feeding as 94.1 ± 2.1 and after feeding as 95.8 ± 2.8. Using these values at a 95% confidence level and 90% power, the estimated sample size was 45. With a 10% non-response rate, the final sample size was adjusted to 50 neonates.

After obtaining informed consent from the parents, eligible neonates were monitored for oxygen saturation using an ACCURO table-top (US-FDA approved) pulse oximeter after calibration with a neonatal probe. [8] SpO_2 values were recorded 1 minute before breastfeeding (baseline), during breastfeeding (every 30 seconds for the first 5 minutes), and immediately after breastfeeding (for at least 5 minutes post-feed). Feeding was conducted in a calm environment, with mothers instructed to breastfeed in their usual position.

Data on gestational age, birth weight, mode of delivery, and relevant maternal and neonatal history were recorded using a structured proforma. SpO_2 recordings were entered contemporaneously. Data were entered into Microsoft Excel and analysed using SPSS version 22.0.Categorical data: Expressed as frequencies and percentages; analysed using the Chi-square test. Continuous data: Presented as mean ± standard deviation (SD).Paired t-test: Used to compare mean oxygen saturation before, during, and after breastfeeding. P-value <0.05 was considered statistically significant. Graphs and charts were created using MS Excel and MS Word.

3. RESULTS

The current study showed that the mean birth weight was 3.03±0.37 kg and the mean gestational age was 39 weeks. 35(70%) babies were born via LSCS and 15(30%) were born via Vaginal delivery. Among the 50 babies 21(42%) were female and 29(58%) were male.

Table 1 presents oxygen saturation levels (%) at 12, 24, 36, and 48 hours.

	Baseline saturation	Saturation during breastfeeding	Saturation after breastfeeding	p- value
12 Hours	95.66±1.23%	94.84±1.19%	95.12±1.61%	0.01**
24 Hours		94.65±1.69%	95.02±1.69%	0.10
36 Hours		94.37±1.57%	94.96±1.59%	0.05*
48 Hours		94.29±1.54%	95.00±1.74%	0.03*

Table 1 presents oxygen saturation levels (%) at 12, 24, 36, and 48 hours, comparing measurements under different conditions (baseline, during breastfeeding, and after breastfeeding) with corresponding p-values indicating statistical significance. The p-values are accompanied by asterisks (* for $p < 0.05$, ** for $p < 0.01$), suggesting significant differences.

At 12 hours the saturation decreases by 0.82% during breastfeeding compared to baseline (95.66% to 94.84%) and partially recovers after breastfeeding (95.12%, still 0.54% below baseline). The significant p-value suggests that the decrease during breastfeeding is not due to random variation, likely reflecting a physiological response (e.g., altered breathing patterns or increased oxygen demand during feeding). The difference between during and after breastfeeding (0.28%) is smaller but contributes to the overall significance, as the post-feeding value approaches baseline. Since all values remain within the normal range, the 0.82% decrease is unlikely to be clinically significant unless associated with symptoms like apnea or desaturation below 90%.

At 24 hours, there is no statistically significant difference between saturation during and after breastfeeding ($p = 0.10$). At 36 hours, there is a statistically significant difference between saturation during and after breastfeeding ($p = 0.05$). Saturation increases by 0.59% after breastfeeding (94.37% to 94.96%), yet the values are in the physiological range. Across all time points, oxygen saturation is lower during breastfeeding compared to after breastfeeding, with differences ranging from 0.28% (12 hours, during vs. after) to 0.71% (48 hours). This trend aligns with physiological changes during feeding, such as altered breathing patterns or increased oxygen demand. The changes in saturation (0.28–0.82%) are small and within the normal range (≥94%), suggesting they are physiologically normal rather than pathological.

4. DISCUSSION

Despite a thorough search of the literature, no studies directly comparable to the present one were found. However, a few closely related studies are discussed below. In a study by Suiter DM et al., where variations in saturation during and after breastfeeding were observed at 1 week and 2 months of age to study cardiopulmonary changes, it was found that mean SpO_2 levels were significantly higher in 2-month-old infants (mean: 97.57) compared to 1-week-old infants (mean: 96.35) ($P = 0.001$). SpO_2 was not affected by any of the three trials (before, during, and after feeding) (9).

A possible physiological explanation for the findings in the present study could be that during breastfeeding, the slight decrease in saturation (e.g., 0.82% at 12 hours, 0.71% at 48 hours) may result from temporary changes in respiratory patterns, such as shallower or less frequent breathing, or from increased oxygen consumption during feeding. This is particularly relevant for infants, who may experience brief periods of reduced ventilation while suckling. After breastfeeding, the recovery or increase in saturation post-feeding (e.g., 0.71% at 48 hours) likely reflects a return to normal breathing patterns and oxygen homeostasis.

In a study by Niaz et al., significantly lower saturation levels during breastfeeding were observed in term infants ($P < 0.001$), with recovery post-feeding, consistent with our current data (10). Preterm infants may show more pronounced changes, but the normal range observed in these studies suggests healthy subjects. In clinical settings, these findings suggest that minor decreases in saturation during breastfeeding are expected and typically resolve post-feeding. However, infants with respiratory issues (e.g., preterm infants or those with congenital conditions) may require closer monitoring. A major limitation of our study is the smaller sample size.

5. CONCLUSION

The normal physiological responses in saturation variations occur in term neonates and are not typically associated with clinical concerns. The significant p-values observed in the studies suggest consistent effects, likely due to transient changes in breathing patterns or oxygen demand during breastfeeding. Based on these findings, monitoring saturation levels up to 48 hours could be considered a standardized tool for assessing feeding difficulties, particularly in infants who may experience temporary saturation decreases. This approach could provide a more objective method for identifying infants who might benefit from further evaluation or intervention

REFERENCES

[1] Victora CG, Bahl R, Barros AJ, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. Lancet. 2016;387(10017):475–490.

[2] Lau C. Development of suck and swallow mechanisms in infants. Ann Nutr Metab. 2015;66(Suppl 5):7–14.

[3] Amaizu N, Shulman RJ, Schanler RJ, Lau C. Maturation of oral feeding skills in preterm infants. Acta Paediatr. 2008;7(1):61–7.

[4] Poets CF, Southall DP. Non-invasive monitoring of oxygenation in infants and children. Pediatrics. 1994;93(5):737–746.

[5] Wolf LS, Glass RP. Feeding and Swallowing Disorders in Infancy: Assessment and Management. Tucson:

Therapy Skill Builders; 1992.

[6] Sweet DG, Carnielli V, Greisen G, et al. European Consensus Guidelines on the Management of Respiratory Distress Syndrome - 2022 Update. Neonatology. 2023;120(4):302–339.

[7] Geddes DT, Sakalidis VS, Hepworth AR, et al. Oxygen saturation and suck-swallow-breathe coordination of term infants during breastfeeding and feeding from a teat releasing milk only with vacuum. Int J Pediatr. 2012;2012:130769.

[8] Sola A, Chow L, Rogido M. Pulse oximetry in neonatal care in 2005. A comprehensive state of the art review. InAnales de Pediatria.2005 ;62(3): 266-28

[9] Suiter DM, Ruark-McMurtrey J. Oxygen saturation and heart rate during feeding in breast-fed infants at 1 week and 2 months of age. Archives of physical medicine and rehabilitation. 2007;88(12):1681-5.

[10] Niaz S, Kumar V, Rahim A, Khan A, Bham A, Ali SR, Niaz II S. Variation in oxygen saturation by pulse oximetry during and after breastfeeding among healthy term neonates during early postnatal life at tertiary care hospital. Cureus. 2021;13(7)...

.