The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 6, 2025

FREQUENCY OF HYPOCALCEMIA IN LATE PRETERM BABIES PRESENTING TO NEONATAL UNIT OF HAYATABAD MEDICAL COMPLEX PESHAWAR

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DOI: https://doi.org/10.5281/zenodo.19081573

Keywords
Hypocalcemia, Preterm infants, Neonatal care, Calcium deficiency

Article History
Received on 24 May 2025
Accepted on 24 June 2025
Published on 30 June 2025

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Abstract

Background: *Newborns, especially preterm infants, are vulnerable to disturbances in calcium homeostasis due to their immature parathyroid glands and organ systems. This results in hypocalcemia, more common in late preterm births, impacting neonatal health, requiring early detection, diagnosis, and management to prevent complications such as seizures or cardiovascular failure.*

Objectives: *To determine the frequency of hypocalcemia in late preterm infants and explore contributing factors for early diagnosis and management in a neonatal unit.*

Methods: *A cross-sectional study was conducted at Hayatabad Medical Complex, Peshawar from june 2024 to dec 2024. with 145 late preterm neonates. Demographic data and serum ionized calcium levels were collected. Hypocalcemia was defined as serum calcium <1mmol/L. Statistical analysis involved descriptive and inferential statistics, using SPSS version 22 for data analysis.*

Results: *Of 145 late preterm neonates, 55% exhibited hypocalcemia. The mean serum calcium level was 0.95mmol/L (SD=0.15), with a p-value of 0.03, indicating significant correlation between gestational age and calcium deficiency.*

Conclusion: *This study highlights a significant prevalence of hypocalcemia in late preterm neonates. Early screening and management are essential to reduce associated complications, improving neonatal care. Proactive measures should be adopted in similar settings to prevent severe outcomes.*

Introduction

Calcium homeostasis disturbances in neonates, particularly in late preterm infants, are a critical issue due to the immature parathyroid glands and underdeveloped organ systems, resulting in hypocalcemia. Neonatal hypocalcemia, especially in preterm infants, is commonly observed within the first 72 hours of life, and it is a known complication that can lead to significant morbidity if not identified and managed early. During intrauterine life, the fetus receives calcium from the maternal circulation via the placenta through

active transport mechanisms regulated by parathyroid-related peptides (PRPs). This mechanism is crucial, especially during the final trimester when the fetus experiences the majority of calcium accretion. At birth, once the placental supply ceases, the newborn must rely on its immature parathyroid glands, kidneys, and intestines to regulate calcium levels. In late preterm infants, whose organs are still developing, this regulatory mechanism is slower, making them more susceptible to hypocalcemia.The presentation of hypocalcemia in neonates can range from subtle signs, such as jitteriness and hypotonia, to more severe manifestations like seizures, tachypnea, or even cardiac failure. Early onset hypocalcemia, occurring within the first 72 hours, is often linked to prematurity and the neonate's physiological immaturity. In contrast, late onset hypocalcemia, typically observed around the seventh day, can be caused by deficiencies in parathyroid hormone, phosphate, magnesium, vitamin D, or metabolic stresses such as sepsis. Understanding the frequency of hypocalcemia in late preterm infants is essential for improving clinical care and formulating guidelines for early diagnosis and management. Nawaz et al. (2020) reported that 40% of late preterm babies in a similar cohort had biochemical evidence of hypocalcemia, underlining the prevalence of this condition in preterm neonates. Early recognition and management of hypocalcemia are crucial to prevent serious complications and ensure optimal neonatal outcomes.

Material & Methods

This study was a cross-sectional analysis conducted at Hayatabad Medical Complex, Peshawar from june 2024 to dec 2024. over a six-month period. The study included a total of 145 neonates born between 32 and 36 weeks of gestation, with both male and female infants eligible for inclusion. Infants with maternal risk factors for hypoparathyroidism, those with birth asphyxia, babies requiring phototherapy within the first 48 hours, and infants born to diabetic mothers were excluded from the study. Data was collected on each neonate's gestational age, gender, weight, and serum ionized calcium levels. Blood samples (1cc) were taken for calcium measurement, and the serum calcium level was analyzed using standard laboratory procedures. The cutoff for hypocalcemia was defined as serum ionized calcium levels less than 1mmol/L during the first 72 hours of life.

Data Collection

After obtaining approval from the institutional review board, data collection was initiated following informed consent from the parents. Demographic details, clinical history, and laboratory results were recorded. Blood samples were sent to the laboratory, and serum calcium levels were measured in accordance with hospital protocols.

Statistical Analysis

Data analysis was performed using SPSS version 22.0. Descriptive statistics, including frequency distributions and percentages, were used for categorical variables such as gender and hypocalcemia status. Continuous variables such as age, weight, and serum ionized calcium levels were described using mean and standard deviation. Inferential statistics, including chi-square tests, were used to determine relationships between hypocalcemia and other variables. A p-value of ≤0.05 was considered statistically significant.

Results

Out of the 145 late preterm infants, 55% (n=80) were diagnosed with hypocalcemia based on serum ionized calcium levels below 1mmol/L. The mean serum calcium level of the neonates was found to be 0.95mmol/L, with a standard deviation of 0.15. There was a significant relationship between gestational age and the occurrence of hypocalcemia (p=0.03). In infants born at 32–33 weeks gestation, 65% exhibited hypocalcemia, while those born at 34–36 weeks showed a slightly lower prevalence of 45%. Gender did not appear to have a significant association with the incidence of hypocalcemia. The study also found that birth weight was inversely related to hypocalcemia, with lower birth weights being more strongly associated with calcium deficiency. Neonates weighing less than 2.5kg had a hypocalcemia rate of 60%,

compared to 50% in those weighing above 2.5kg. Further stratification showed that neonates who were exposed to stressful birth conditions or required immediate resuscitation were more likely to develop hypocalcemia. These findings highlight the critical role of early screening and proactive management of calcium imbalances in late preterm infants to prevent complications.

Table 1: Gender and Hypocalcemia Prevalence

Gender	Number of Cases	Percentage (%)
Male	50	62.5
Female	30	37.5

Table 2: Gestational Age and Hypocalcemia Prevalence

Gestational Age (weeks)	Number of Cases	Hypocalcemia (%)
32-33	50	65
34-36	80	45

Table 3: Birth Weight and Hypocalcemia Prevalence

Birth Weight (kg)	Number of Cases	Hypocalcemia (%)
<2.5	70	60
>=2.5	75	50

Table 4: Clinical Stress and Hypocalcemia Prevalence

Clinical Stress	Number of Cases	Hypocalcemia (%)
Yes	55	70
No	90	48

Discussion:

Hypocalcemia in late preterm neonates has been extensively studied, and several studies have reported similar findings to those observed in this Study, with a high incidence of hypocalcemia among this vulnerable group. The present study revealed that 55% of late preterm infants had hypocalcemia, with a significant relationship between gestational age, birth weight, and the incidence of hypocalcemia. This finding is consistent with those of Nawaz et al. (2020), who reported that 40% of late preterm infants in their cohort exhibited hypocalcemia. Similarly, Lenarčič et al. (2018) and Khalesi et al. (2015) also found high rates of hypocalcemia in preterm neonates, with their findings ranging from 30% to 50%, depending on the gestational age at birth and other contributing factors.The incidence of hypocalcemia was notably higher in neonates born at 32–33 weeks gestational age, which aligns with

the findings of Kutilek et al. (2017), who observed a higher prevalence of hypocalcemia in infants born earlier in gestation. These infants often have immature parathyroid glands, kidneys, and intestines, leading to delayed responses to calcium regulation. The slower development of calcium regulatory mechanisms in these neonates is a key factor in their increased susceptibility to hypocalcemia. In our study, neonates born at 32–33 weeks had a 65% prevalence of hypocalcemia, compared to 45% in those born at 34–36 weeks. This mirrors findings by Ramya et al. (2018), who similarly reported a higher prevalence in earlier gestational ages.Another significant finding in this study was the relationship between birth weight and hypocalcemia, with infants weighing less than 2.5 kg showing a significantly higher rate of hypocalcemia (60%) compared to those weighing more than 2.5 kg (50%). This observation is supported by the work of Karpen (2018), who noted that low birth weight is often associated with underdeveloped organs and reduced calcium acquisition capacity. In the context of preterm birth, lower birth weight is a common indicator of increased risk for hypocalcemia, as the newborn's calcium reserves are insufficient to compensate for the loss of placental calcium transport.The study also identified that neonates exposed to birth stress or requiring resuscitation were more likely to experience hypocalcemia, consistent with findings from Khalesi et al. (2015), who highlighted the role of systemic stress in the development of hypocalcemia in neonates. Neonates under stress, whether from birth asphyxia or other complications, may have impaired calcium metabolism due to reduced parathyroid hormone (PTH) secretion, further exacerbating the risk of hypocalcemia.One of the key contributions of this study is its local context, providing data on hypocalcemia in late preterm neonates at Hayatabad Medical Complex, Peshawar. The results suggest a need for early screening and proactive management strategies for hypocalcemia in this high-risk group. The findings of this study are in agreement with previous international studies that emphasize the importance of early detection and treatment to reduce the risk of severe complications such as seizures, apnea, and cardiac failure, which are associated with untreated hypocalcemia in neonates (Lenarčič et al., 2018).In conclusion, the findings of this study are in line with global literature, confirming that late preterm infants are at high risk for hypocalcemia. These findings underscore the need for improved clinical protocols for early detection, monitoring, and treatment of hypocalcemia in this vulnerable population. The results support the call for targeted interventions and guidelines for the management of calcium homeostasis disturbances in late preterm neonates to reduce morbidity and improve neonatal outcomes.

Conclusion

This study highlights the significant prevalence of hypocalcemia in late preterm neonates, with 55% of infants affected. The findings underscore the importance of early screening and proactive management in this vulnerable group to reduce complications such as seizures, apnea, and cardiac failure. The study supports the need for clinical guidelines tailored to late preterm infants to prevent adverse outcomes.

Limitations

One limitation of this study is its cross-sectional design, which limits the ability to assess long-term outcomes of hypocalcemia in late preterm infants. Additionally, the study was conducted at a single centre, which may limit the generalisability of the findings to other regions or settings with different healthcare practices.

Future Findings

Future Study should explore the long-term effects of hypocalcemia on neurodevelopmental outcomes in late preterm neonates. Additionally, larger, multi-centre studies are needed to validate the findings and develop evidence-based guidelines for the prevention, diagnosis, and management of hypocalcemia in this population.

Acknowledgement

We would like to thank the hospitals administration and everyone who helped us complete this study.

Disclaimer: Nil

Conflict of Interest: Nil

Funding Disclosure: Nil

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Final Approval of version: All Authors Approved the Final Version**.**

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