# Frequency of Hypoglycemia in Neonates a Cross-Sectional Study

### Rabiha Manzoor, Qurat ul Ain Ali, Misbah Kokab Shafique and Bushra Mushtaq

## ABSTRACT

**Objective:** To determine the frequency of hypoglycemia in neonates admitted to the Neonatal Intensive Care Unit (NICU) at Ayub Teaching Hospital, Abbottabad.

**Study Design:** Cross-sectional study

**Place and Duration of Study:** This study was conducted at the department of Neonatal Intensive Care Unit (NICU) at Ayub Teaching Hospital, Abbottabad from 05- Jan 2021 to 05-July 2021.

**Materials and Methods:** Laboratory data, including blood glucose levels, were collected. Risk factors and signs of hypoglycemia were documented. Data was analyzed using SPSS 20.0.

**Results:** The study included neonates with a mean age of 15.49±7.85 days. Of the patients, 46.76% were male and 53.24% were female. The mean gestational age at birth was 37.38±2.21 weeks. The mean glucose level at presentation was 76.63±22.55 mg/dl. Hypoglycemia was observed in 18.98% of patients, while 81.02% had normal glycemic levels. Risk factors included infants of diabetic mothers (51.22%), large for gestational age (9.76%), postdates birth (4.88%), premature birth (24.39%), and small for gestational age (9.76%).

**Conclusion:** Although the frequency of hypoglycemia was not high, attention should be given to its management. Infants of diabetic mothers are at higher risk, necessitating increased care and surveillance after birth.

**Key Words:** Neonates, hypoglycemia, glycemic level, infants of diabetic mother, large for gestational age, small for gestational age, prematurity, postdates.

## INTRODUCTION

Neonatal hypoglycemia is a common issue encountered in neonatology, reflecting an imbalance between glucose supply and utilization due to immature regulatory mechanisms.[1,2] While it is not a disease itself, neonatal hypoglycemia can be a part of an underlying illness or the inability to adapt to extra-uterine physiology.[3,4] The incidence of hypoglycemia in newborns varies based on definitions and measurement methods. Estimates suggest an overall incidence of 13-5 per 1,000 live births, with higher rates observed in at-risk populations.[5] Recent studies report a rate of 16.9% for neonatal hypoglycemia. Diagnosing neonatal hypoglycemia often occurs during routine screening of apparently healthy infants considered to be at risk. abnormalities on brain imaging and adverse neurodevelopmental effects, but recent studies present conflicting data.[6,7]

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Various risk factors for neonatal hypoglycemia have been identified, including macrosomia, cesarean section, lower gestational age, and treatment for choriamnionitis. Small for gestational age neonates are also at a greater risk.[8,9] It is crucial to prevent harmful hypoglycemia in vulnerable infants, but this must be balanced with the potential risks of invasive management, such as separating mother and infant and interfering with breastfeeding and metabolic adaptation to postnatal life. This study aims to estimate the incidence of hypoglycemia in neonates and identify the prevalence of risk factors associated with this condition. The findings will contribute to the existing knowledge and assist healthcare practitioners, planners, and policymakers in developing meaningful interventions at both clinical and community levels.

## MATERIALS AND METHODS

A six-month cross-sectional study was conducted in department of Neonatal Intensive Care Unit (NICU) at Ayub Teaching Hospital, Abbottabad from 05-Jan 2021 to 05-July 2021. Laboratory data, including blood glucose levels, were collected. Risk factors and signs of hypoglycemia were documented. Data was analyzed using SPSS 20.0.

## RESULTS

The study included neonates with a mean age of 15.49±7.85 days. Of the patients, 46.76% were male

and 53.24% were female. The mean gestational age at birth was 37.38±2.21 weeks. The mean glucose level at presentation was 76.63±22.55 mg/dl. Hypoglycemia was observed in 18.98% of patients, while 81.02% had normal glycemic levels. Risk factors included infants of diabetic mothers (51.22%), large for gestational age (9.76%), postdates birth (4.88%), premature birth (24.39%), and small for gestational age (9.76%).

**Table No. 1: Descriptive Statistics of age of patients**

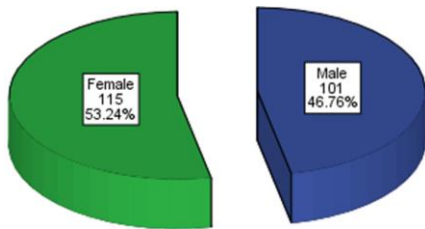|            | N                  | 216   |
|------------|--------------------|-------|
| Age (days) | Mean               | 15.49 |
|            | Standard deviation | 7.85  |
|            | Minimum            | 2     |
|            | Maximum            | 28    |



**Figure No. 1: Distribution of gender of patients**

**Table No. 2: Descriptive Statistics of gestational age at birth**

|                            | N                  | 216   |
|----------------------------|--------------------|-------|
| Gestational Age<br>(weeks) | Mean               | 37.38 |
|                            | Standard deviation | 2.21  |
|                            | Minimum            | 27    |
|                            | Maximum            | 42    |

**Table No. 3: Descriptive Statistics of glucose level of patients**

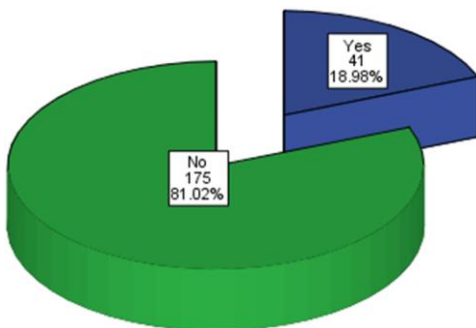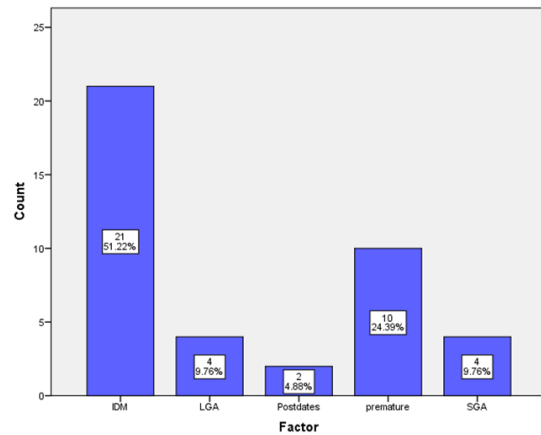|                           | N                     | 216   |
|---------------------------|-----------------------|-------|
| Glucose level<br>(mg/dl)  | Mean                  | 76.63 |
|                           | Standard<br>deviation | 22.55 |
|                           | Minimum               | 20    |
|                           | Maximum               | 110   |



**Figure No. 2: Distribution of hypoglycemia**
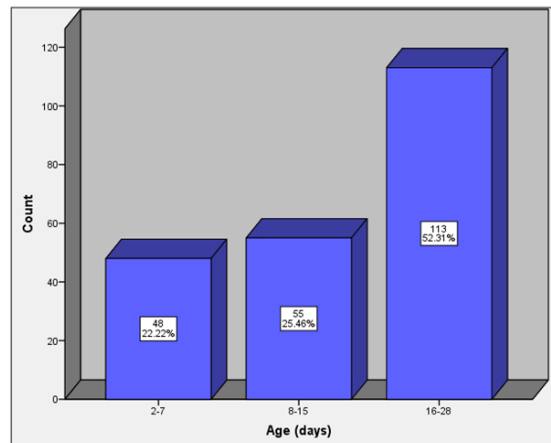


**Figure No. 3: Distribution of factors**



**Figure No. 4: Distribution of patients in age strata**

**Table No. 4: Comparison of hypoglycemia in age strata**

|              |     | Age (days) |       |        | Total  |
|--------------|-----|------------|-------|--------|--------|
|              |     | 2-7        | 8-15  | 16-28  |        |
| Hypoglycemia | Yes | 7          | 17    | 17     | 41     |
|              |     | 14.6%      | 30.9% | 15.0%  | 19.0%  |
|              | No  | 41         | 38    | 96     | 175    |
|              |     | 85.`4%     | 69.1% | 85.0%  | 81.0%  |
| Total        |     | 48         | 55    | 113    | 216    |
|              |     | 100%       | 100%  | 100%   | 100%   |

Chi-Square Test = 6.831
p-value = 0.033 (Significant)

**Table No. 5: Comparison of hypoglycemia in gender strata**

|              |     | Gender |        | Total  |
|--------------|-----|--------|--------|--------|
|              |     | Male   | Female |        |
| Hypoglycemia | Yes | 23     | 18     | 41     |
|              |     | 22.8%  | 15.7%  | 19.0%  |
|              | No  | 78     | 97     | 175    |
|              |     | 77.2%  | 84.3%  | 81.0%  |
| Total        |     | 101    | 115    | 216    |
|              |     | 100%   | 100%   | 100%   |

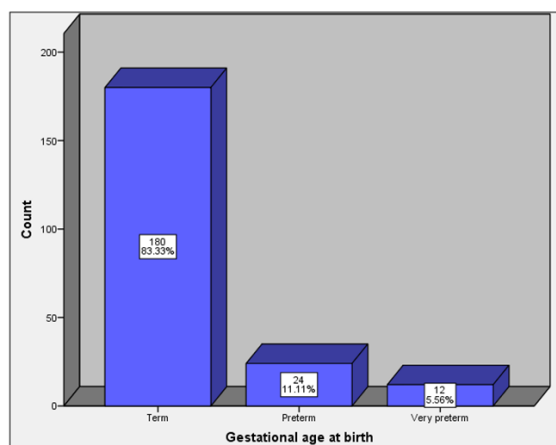Chi-Square Test = 1.773
p-value = 0.183 (Insignificant)

**Figure No. 5: Distribution of patients in gestational age strata**

**Table No. 6: Comparison of hypoglycemia in gestational age strata**

| | | Gestational Age (weeks) | | | Total |
|---|---|---|---|---|---|
| | | Term | Preterm | Very preterm | |
| Hypoglycemia | Yes | 23 | 7 | 11 | 41 |
| | | 12.8% | 29.2% | 91.7% | 19.0% |
| | No | 157 | 17 | 1 | 175 |
| | | 87.2% | 70.8% | 8.3% | 81.0% |
| Total | | 180 | 24 | 12 | 216 |
| | | 100% | 100% | 100% | 100% |

Chi-Square Test = 47.348
p-value = 0.000 (Significant)

**Table No. 7: Comparison of factors in hypoglycemic neonates for age strata**

| | | Age (days) | | | Total |
|---|---|---|---|---|---|
| | | 2-7 | 8-15 | 16-28 | |
| Factor | IDM | 3 | 7 | 11 | 21 |
| | | 6.3% | 12.7% | 9.7% | 9 |
| | LGA | 0 | 2 | 2 | 4 |
| | | 0.0% | 3.6% | 1.8% | 1.9% |
| | Premature | 2 | 5 | 3 | 10 |
| | | 4.2% | 9.1% | 2.7% | 4.6% |
| | SGA | 1 | 2 | 1 | 4 |
| | | 2.1% | 3.6% | 0.9% | 2.3% |
| | Postdates | 1 | 1 | 0 | 2 |
| | | 2.1% | 1.8% | 0.0% | 0.9% |
| Total | | 7 | 17 | 17 | 41 |
| | | 100% | 100% | 100% | 100% |

Chi-Square Test = 2.5047
p-value = 0.962 (Insignificant)

**Table No. 8: Comparison of factors in hypoglycemic neonates for gender strata**

| | | Gender | | Total |
|---|---|---|---|---|
| | | Male | Female | |
| Factor | IDM | 12 | 9 | 21 |
| | | 11.9% | 7.8% | 9.7% |
| | LGA | 3 | 1 | 4 |
| | | 3.0% | 0.9% | 1.9% |
| | Premature | 4 | 6 | 10 |
| | | 4.0% | 5.2% | 4.6% |
| | SGA | 2 | 2 | 4 |
| | | 2.0% | 1.7% | 1.9% |
| | Postdates | 2 | 0 | 2 |
| | | 2.0% | 0.0% | 0.9% |
| Total | | 23 | 18 | 41 |
| | | 100% | 100% | 100% |

Chi-Square Test = 1.7973
p-value = 0.773 (Insignificant)

**Table No. 9: Comparison of factors in hypoglycemic neonates for gestational age strata**

| | | Gestational Age (weeks) | | | Total |
|---|---|---|---|---|---|
| | | Term | Preterm | Very preterm | |
| Factor | IDM | 13 | 6 | 2 | 21 |
| | | 7.2% | 25.0% | 16.7% | 9.7% |
| | LGA | 4 | 0 | 0 | 4 |
| | | 2.2% | 0.0% | 0.0% | 1.9% |
| | Premature | 0 | 1 | 9 | 10 |
| | | 0.0% | 4.2% | 75.0% | 4.6% |
| | SGA | 4 | 0 | 0 | 4 |
| | | 2.2% | 0.0% | 0.0% | 1.9% |
| | Postdates | 2 | 0 | 0 | 2 |
| | | 1.1% | 0.0% | 0.0% | 0.9% |
| Total | | 23 | 7 | 11 | 41 |
| | | 100% | 100% | 100% | 100% |

Chi-Square Test = 20.3085
p-value = 0.009 (Significant)

**Data Analysis:** Data was analyzed using SPSS 20.0. Quantitative variables like age and laboratory values like blood glucose were described in terms of mean ± standard deviation. Categorical data like gender, hypoglycemia and factors were described in terms of frequency and percentages. Data was stratified by age, gender and factors with respect to outcome variable i.e. hypoglycemia. Post stratification chi square test at 5% level of significance was applied. All result was presented as tables and diagrams.

# DISCUSSION

Hypoglycemia, or low blood sugar, is a common condition among babies who are recommended for routine blood glucose screening. This screening is particularly important for babies at risk of neonatal hypoglycemia. However, the incidence of hypoglycemia in babies who undergo screening is not well documented. In a study conducted, it was found that the average glucose level at the time of presentation of patients was 76.63±22.55mg/dl. Out of the patients, 41 (18.98%) had hypoglycemia, while 175 (81.02%) had normal blood sugar levels.[10] The main factors contributing to hypoglycemia were infants of

diabetic mothers (51.22%), large for gestational age (LGA) babies (9.76%), post-term births (4.88%), premature births (24.39%), and small for gestational age (SGA) babies (9.76%). Another study reported a hypoglycemia rate of 16.9% in neonates.[11] Different studies have reported varying rates of hypoglycemia in neonates. For example, one study found that the incidence of hypoglycemia in neonates was 67% in preterm SGA babies, 25% in term SGA infants, and 18% in post-term SGA babies.[12] In full-term appropriately grown infants, the incidence was 10%. The incidence of hypoglycemia can also be influenced by other factors such as gestational age, birth weight, and the presence of maternal diabetes.

A Japanese study revealed that more than 80% of admissions from the nursery to the neonatal intensive care unit were due to apnea or hypoglycemia in neonates born at 35-36 weeks' gestation.[13] In other studies, the frequency of hypoglycemia in neonates ranged from 3.5% to 29.1%, with differences attributed to variations in the definition of hypoglycemia, inclusion criteria, sample size, and methods of detection. In a study conducted in Turkey, it was found that 16.7% of infants born to non-diabetic mothers with a birth weight greater than 4000g (LGA infants) had hypoglycemia.[14] This rate was significantly higher compared to appropriate for gestational age infants. The study emphasized the importance of routine blood glucose screening in LGA infants due to the potential serious consequences of hypoglycemia. Several studies have identified risk factors associated with neonatal hypoglycemia. These include gestational age, maternal diabetes, low birth weight, twin delivery, refusal of feeding, hyporeflexia, irritability, cyanosis, tachypnea, seizures, weak cry, apneic spells, pallor, and cardiac arrest. It has been observed that most episodes of hypoglycemia occur within the first 24 hours of birth. The findings of these studies highlight the significance of routine blood glucose screening in at-risk neonates and the need for careful monitoring and management of hypoglycemia to prevent potential complications. Understanding the risk factors associated with hypoglycemia can help healthcare providers identify high-risk infants and provide appropriate interventions to ensure their well-being. In summary, hypoglycemia is a common condition among babies recommended for routine blood glucose screening. The incidence of hypoglycemia varies in different studies and is influenced by factors such as gestational age, birth weight, and the presence of maternal diabetes. Routine screening and careful management are crucial in identifying and treating hypoglycemia in neonates to prevent complications.

## CONCLUSION

In conclusion, neonatal hypoglycemia is a common condition that requires routine screening and careful management to prevent potential complications. Our study found that 18.98% of neonates presented with hypoglycemia, with risk factors such as infants of diabetic mothers, large for gestational age, premature birth, and small for gestational age. The incidence of hypoglycemia varies across studies, emphasizing the need for standardized definitions and measurement methods. It is crucial for healthcare practitioners to be aware of the risk factors and signs of hypoglycemia in neonates to ensure timely intervention and minimize the potential risks. However, further research is needed to assess the long-term outcomes and effectiveness of interventions in managing neonatal hypoglycemia. Overall, our findings contribute to the existing knowledge on neonatal hypoglycemia and provide valuable insights for healthcare providers, planners, and policymakers in developing appropriate interventions at both the clinical and community levels.

**Author's Contribution:**

| | |
|---|---|
| Concept & Design of Study: | Rabiha Manzoor |
| Drafting: | Qurat ul Ain Ali, Misbah Kokab Shafique |
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| Revisiting Critically: | Rabiha Manzoor, Qurat ul Ain Ali |
| Final Approval of version: | Rabiha Manzoor |

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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