

Prevalence and Clinical Correlates of Neonatal Hypoglycaemia Among Neonates Admitted to the Special Care Baby Unit of a Nigerian Tertiary Hospital: A Retrospective Study

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Abstract

Background: Neonatal hypoglycaemia is a common metabolic abnormality in newborns and may be associated with neurological injury and death, particularly in high-risk neonates. This study assessed the burden and clinical correlates of low blood glucose among neonates admitted to the Special Care Baby Unit (SCBU) of the University of Benin Teaching Hospital (UBTH). **Methods:** This retrospective cross-sectional study reviewed SCBU records from 1 January to 31 December 2024. Of 623 records identified, 219 neonates had sufficiently complete records and documented blood glucose values for analysis. Data were analysed with SPSS version 27. Categorical variables were summarized as frequencies and percentages, and associations were assessed using chi-square tests. Hypoglycaemia was defined in the source dataset as blood glucose ≤ 40 mg/dL, with values < 30 mg/dL classified as severe and 31–40 mg/dL as moderate. **Results:** Of the 219 neonates analysed, 121 (55.3%) were male. Preterm low birth weight was the commonest recorded diagnosis (52.5%), followed by neonatal sepsis (37.4%) and neonatal asphyxia (10.0%). Severe hypoglycaemia occurred in 88 (40.2%) and moderate hypoglycaemia in 80 (36.6%), giving a prevalence of 76.7% among analysed neonates. Ninety neonates (41.1%) died. Blood glucose category was significantly associated with mortality ($\chi^2=15.91$, $p=0.007$) and diagnosis ($\chi^2=24.21$, $p=0.0071$), but not with gestational-age category ($\chi^2=30.18$, $p=0.067$) or sex ($\chi^2=5.0$, $p=0.60$). **Conclusion:** Low blood glucose was frequent among neonates with complete glucose records admitted to this tertiary SCBU and was associated with mortality and diagnostic category. The findings support early glucose surveillance and prompt management in high-risk admitted neonates, while the retrospective, selected-record design limits generalization of the prevalence estimate.

Keywords: Neonatal hypoglycaemia; preterm; low birth weight; neonatal sepsis; mortality; Special Care Baby Unit; Nigeria.

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INTRODUCTION

Neonatal hypoglycaemia is among the most frequently encountered metabolic abnormalities in newborn care. Glucose is an important substrate for the neonatal brain, and severe or prolonged low blood glucose can cause neuroglycopenia and brain injury. However, a single universally accepted diagnostic threshold does not exist; operational thresholds vary according to postnatal age, clinical context, symptoms, and guideline. [1-3]

The transition from continuous placental glucose delivery to intermittent enteral feeding makes

the early neonatal period particularly vulnerable to low glucose concentrations. Infants born preterm or small for gestational age, infants of mothers with diabetes, and sick neonates with conditions such as sepsis or perinatal asphyxia are commonly considered at increased risk. [1-4] In a prospective cohort of at-risk infants of at least 35 weeks' gestation, Harris and colleagues found that 51% developed glucose concentrations below 2.6 mmol/L, with most episodes occurring during the first 24 hours of life. [4]

The clinical importance of neonatal hypoglycaemia extends beyond the immediate metabolic

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disturbance because recurrent or severe episodes may be associated with adverse neurological outcomes. A systematic review and meta-analysis by Shah *et al.*, found associations between neonatal hypoglycaemia and later visual-motor impairment, executive dysfunction, and some adverse outcomes detected in mid-childhood, although the quality and consistency of the available evidence varied. [5] More recent evidence also supports an association between neonatal hypoglycaemia and neurodevelopmental impairment, cognitive impairment and visual-motor dysfunction, while emphasizing the low certainty of much of the evidence.[6]

Recognition and management remain challenging because many affected neonates may be asymptomatic and because recommended operational thresholds differ across professional guidance. Contemporary reviews therefore emphasize risk-based screening, timely feeding and treatment, and careful interpretation of glucose values in relation to postnatal age and clinical condition. [7]

The burden in neonatal units in low-resource settings may be amplified by prematurity, low birth weight, infection, delayed feeding, and limited capacity for repeated biochemical monitoring. Local data are therefore useful for identifying the groups in whom glucose surveillance should be prioritized. This study assessed the prevalence of neonatal hypoglycaemia among neonates with documented glucose measurements admitted to the UBTH SCBU during a one-year period and examined associations between blood glucose category and mortality, gestational age, diagnosis, and sex.

METHODS

Study design and setting: This was a retrospective cross-sectional review conducted in the Special Care Baby Unit of the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria, a tertiary referral hospital serving Edo State and neighbouring areas.

Study period and population: Records of neonates admitted between 1 January and 31 December 2024 were reviewed. A total-population sampling approach was used. Neonates were eligible when a blood

glucose result and the required clinical information were available. Records without documented blood glucose or with missing essential information were excluded. Of 623 records identified, 219 met the completeness criteria and were analysed.

Data collection: Information was extracted from case records, glucose monitoring records and the SCBU admission register using a standardized data-extraction form. Variables available in the source dataset included age at admission, sex, gestational age, diagnosis, maternal factor, blood glucose, length of admission and outcome.

Definition of outcome: The source study defined neonatal hypoglycaemia as a documented blood glucose concentration ≤ 40 mg/dL. For analysis, blood glucose was grouped as severe hypoglycaemia (<30 mg/dL), moderate hypoglycaemia (31–40 mg/dL), and normal/borderline (>40 mg/dL). Because contemporary guidance uses differing operational thresholds, these categories are reported as the prespecified thresholds of the source study rather than as a universal clinical definition. [1-3]

Statistical analysis: Data were analysed using SPSS version 27. Categorical variables were summarized as frequencies and percentages. Associations between categorical blood glucose groups and selected variables were assessed using chi-square tests. Statistical significance was set at $p < 0.05$.

Ethical considerations: Ethical approval was obtained from the University of Benin Teaching Hospital Health Research Ethics Committee (Protocol No. ADM/E 22/A/VOL. VII/IHST/M/2025/3; approval dated 2 June 2025). Patient identifiers were excluded from the analytic dataset and records were handled confidentially.

RESULTS

A total of 623 records were identified, of which 219 had complete information required for analysis. Most neonates were recorded as being admitted within the first seven days of life. There were 121 males (55.3%) and 98 females (44.7%).

Table 1: Selected demographic and clinical characteristics of analysed neonates (n=219)

Characteristic	n (%)
Male	121 (55.3)
Female	98 (44.7)
Preterm low birth weight	115 (52.5)
Neonatal sepsis	82 (37.4)
Neonatal asphyxia	22 (10.0)
Severe hypoglycaemia (<30 mg/dL)	88 (40.2)
Moderate hypoglycaemia (31–40 mg/dL)	80 (36.6)
Normal/borderline (>40 mg/dL)	51 (23.2)
Death	90 (41.1)
Survived/discharged	129 (58.9)

Overall, 168 of 219 neonates had blood glucose values within the study-defined hypoglycaemic categories, corresponding to 76.7% of the analysed sample. Preterm low birth weight was the most frequent

diagnostic category. Maternal factors recorded included infections (69 cases), obstetric complications (65), metabolic conditions (43), and hypertensive disorders (33).

Table 2: Blood glucose category and mortality. $\chi^2=15.91$; $p=0.007$

Blood glucose (mg/dL)	Death, n	No death, n	Total
20–25	19	8	27
26–30	24	37	61
31–35	19	21	40
36–40	15	25	40
41–45	6	21	27
46–50	7	17	24
Total	90	129	219

Blood glucose category was significantly associated with mortality ($\chi^2=15.91$, $p=0.007$). The proportion dying was highest in the 20–25 mg/dL

category (19/27; 70.4%) and generally lower in the higher glucose categories.

Table 3: Blood glucose category and recorded diagnosis. $\chi^2=24.21$; $p=0.0071$

Blood glucose (mg/dL)	Preterm LBW	Asphyxia	Sepsis	Total
20–25	16	1	10	27
26–30	38	5	18	61
31–35	22	1	17	40
36–40	24	3	13	40
41–45	10	6	11	27
46–50	5	6	13	24
Total	115	22	82	219

There was a statistically significant association between blood glucose category and diagnostic group ($\chi^2=24.21$, $p=0.0071$). In contrast, the association between blood glucose and gestational-age category did not reach statistical significance ($\chi^2=30.18$, $p=0.067$), and there was no significant association with sex ($\chi^2=5.0$, $p=0.60$).

DISCUSSION

This retrospective review found a high proportion of study-defined hypoglycaemia among neonates with complete glucose records admitted to the UBTH SCBU. Severe and moderate hypoglycaemia together accounted for 76.7% of the analysed cohort. This estimate represents the prevalence among the analysed neonates with documented glucose results rather than among all SCBU admissions or all newborns.

The high burden is biologically plausible in a tertiary neonatal unit in which preterm low-birth-weight infants and neonates with sepsis constituted large proportions of admissions. Prematurity and growth restriction are recognized risk settings because limited glycogen reserves, immature counter-regulatory responses, feeding difficulty and intercurrent illness can impair glucose homeostasis. [1-3] The finding also accords with the high frequency of hypoglycaemia reported among prospectively screened at-risk newborns, although direct numerical comparison is

limited by differences in screening populations, thresholds and gestational-age distributions.[4]

Blood glucose category was significantly associated with mortality, with the highest observed death proportion in the lowest glucose group. Severe hypoglycaemia can produce neuroglycopenia and may occur alongside serious neonatal illness.[1] Evidence from systematic reviews has linked neonatal hypoglycaemia with adverse neurodevelopmental outcomes, particularly when episodes are severe or recurrent.[5-6] In neonates with encephalopathy, a systematic review and meta-analysis also found that hypoglycaemia was associated with a higher combined risk of death or neurodevelopmental impairment.[9] These findings underline the clinical importance of early recognition and management of low glucose in sick neonates.

A significant association was also observed between blood glucose category and diagnosis. Preterm low-birth-weight neonates were strongly represented in the lower glucose groups, consistent with their recognized vulnerability to disturbed glucose homeostasis. [1-3] The association between gestational-age category and glucose category, however, did not reach the conventional 5% significance threshold in this study, indicating that low glucose occurred across more than one clinical group.

Neonatal sepsis accounted for 37.4% of the recorded diagnoses and was represented across the glucose categories. Acute illness can increase glucose consumption, reduce feeding and disrupt metabolic adaptation, making glucose surveillance particularly relevant in clinically unwell neonates. [1-7] Similarly, perinatal asphyxia may coexist with disturbed glucose regulation, and abnormalities of glycaemia have been associated with adverse outcomes among neonates with encephalopathy. [9]

Sex was not significantly associated with blood glucose category. This finding is consistent with the clinical approach of identifying neonates for glucose surveillance primarily on the basis of recognised metabolic and clinical risk factors rather than sex. Current reviews emphasize targeted screening of preterm, growth-restricted, infants of diabetic mothers and clinically unwell neonates. [1-7-8]

The study has practical implications for neonatal care in similar settings. Prompt glucose measurement in preterm, low-birth-weight and clinically ill neonates, together with early feeding when appropriate and timely treatment of symptomatic or severe hypoglycaemia, remains important. [1-7-8] The wide variation in operational thresholds across guidelines also means that local protocols should clearly define the measurement method, timing of sampling, threshold for intervention and repeat-testing schedule.

Beyond short-term stabilization, prevention of severe and recurrent hypoglycaemia is important because later developmental effects may not always be apparent during the neonatal admission. Systematic reviews have reported associations with cognitive, executive and visual-motor outcomes, although the certainty of evidence remains variable. [5-6] This supports appropriate follow-up of high-risk neonates while further prospective studies clarify the relationship between severity, duration, recurrence and long-term outcome.

Strengths and Limitations

This study provides valuable local one-year data from a tertiary neonatal unit and examines clinically relevant relationships between blood glucose levels, diagnosis, and mortality. Its main limitations are the retrospective single-centre design and reliance on available medical records, which may limit the generalisability of the findings.

CONCLUSION

Neonatal hypoglycaemia, using the study-defined threshold, was common among neonates with complete glucose records admitted to the UBTH SCBU. Lower glucose categories were associated with mortality, and glucose category was associated with

diagnostic group but not with sex or gestational-age category. These findings support systematic glucose surveillance in high-risk admitted neonates and prompt treatment according to a clearly defined neonatal glucose protocol. Prospective studies with standardized glucose measurement and multivariable analysis are needed to establish independent predictors and outcomes.

Declarations

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Competing Interests: No competing-interest.

Data Availability: The manuscript is based on hospital records. A journal-specific data-availability statement should be completed by the author/institution before submission.

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