**Original Article**

# Hypoglycemic status in low birth weight neonates during first 24 hours of life after birth

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## Abstract

**Objective:** The study aimed to determine the frequency of hypoglycemia in low birth weight neonates during the first 24 hours of life after birth.

**Materials and Methods:** This cross-sectional study was conducted from 1st March 2016 to 31st August 2016 in the NICU and postnatal ward of POF Hospital, Wah Cantt. All the babies with birth weight less than 2.5 kg including preterm and term were included in the study. After the aseptic measure blood, sugar was checked and a value less than 45 mg/dl was labelled as hypoglycemia.

**Results:** Out of 96 neonates,51 (53%) were male and 45 (47%) were female. The minimum weight of the patient was 1.6kg and the maximum was 2.40 kg. Hypoglycemia was noted in 49 (51%) babies after 2 hours of birth whereas 36 (37.5%) had hypoglycemia at 4 hours and 13 (13.5 %) had at 24 hours. 68 (70.8%) babies included in the study were appropriate for gestational age (AGA) and 28 (29.1%) babies were small for gestational age (SGA). After 2 hours of birth, hypoglycemia was present more in SGA babies i.e.20 (71.4%) as compared to AGA babies i.e. 29 (42.6%) which had statistical significance also (p-value 0.01).

**Conclusion:** Neonatal hypoglycemia is a well-recognized complication in newborns and low birth weight infants are more susceptible to hypoglycemia. Early identification of vulnerable infants and the use of preemptive measures can result in better outcomes.

**Keywords:** Low birth weight neonates, Small for gestational age, Hypoglycemia, Appropriate for gestational age.

## Introduction

According to WHO guidelines, low birth weight (LBW) is defined as "birth weight less than 2.5 kg or 2500gm and could be due to prematurity or intrauterine growth retardation.[1] In 2015, 1 in every seven newborns had low birth weight and the maximum prevalence was observed in South Asia i.e. 26.4%.[2] The incidence of LBW in Pakistan is high and ranges from 19% to 32%.[3] LBW has not only been related to neonatal morbidity and mortality but also has consequences like stunting and low IQ in later childhood thus having a financial impact on family and society.[4,5]

Hypoglycemia is one of the most common metabolic complications in LBW babies and could be asymptomatic or present in various ways like reluctance to feed, jitteriness, convulsions, floppiness, and tachycardia.[6] Hypoglycemia can result in neonatal encephalopathy and if undiagnosed can also lead to long-term neurological morbidity. It has been emphasized that early detection and prompt treatment of hypoglycemia results in better outcomes for LBW babies.[7] To date, there are few local studies regarding the incidence of hypoglycemia in low birth weight neonates. The outcomes of this study will aid to estimate the incidence of hypoglycemia in LBW neonates and will benefit to create strategies concerning low birth weight neonates' blood glucose monitoring.

## Materials and Methods

This cross-sectional study was done in NICU and post-natal ward of POF Hospital, Wah Cantt. from 1st March 2016 to 31st August 2016 after taking approval from the ethical committee of the hospital. WHO sample size calculator was used to calculate the sample size of 96 cases, with a 10% margin of error, 95% confidence level taking the expected incidence of hypoglycemia as 51.79%.[8] The sampling technique was non-probability consecutive sampling.

Inclusion Criteria: Newborn weighing less than 2.5 kg and of both sexes.

Exclusion Criteria:

1. Neonates with a birth weight more than 2.5kg
2. Neonatesrequiring IV fluids
3. Babies born to diabetic mothers.
4. Sick low birth weight neonates with signs of illness.
5. Neonates with a history of birth asphyxia.
6. Neonates with a maternal history of premature rupture of membranes.

All newborns delivered in POF hospital and fulfilling the inclusion criteria were registered in the study. Demographic data like age and gender were noted on a specifically intended Performa. Complete physical examination including the anthropometry was done at the time of enrolment. The gestational age of each newborn was calculated by using obstetric notes and a new Ballard score. Blood was obtained via heel prick and serial monitoring of Blood Glucose was done at 2 hours, 4 hours, and 24 hours after birth via Accu Check Glucometer. For analysis 45 mg/dl was considered hypoglycemia and if found, the venous sample was sent to a laboratory for confirmation. All babies were started on either breast milk or formula milk after delivery. Those babies who during observation developed poor feeding, jitteriness, irritability, lethargy, tremors, weak cry, apnoea, fits, vomiting, tachypnea, and sweating were considered to have clinical signs of hypoglycemia and were started on I/V fluids and excluded from the study.

SPSS version 16 was used for the entry and analysis of data. For quantitative variables Mean ± SD were calculated. Frequencies and percentages were measured for qualitative variables. Independent t-test was used for quantitative variables and Chi-square was used for qualitative variables. P-value ≤ 0.05 was considered significant.

## Results

Out of 96 newborns who were included in the study, 51 (53%) were male and 45 (47%) were females. The minimum weight of the newborns was 1.6 kg; the maximum was 2.4 kg with a mean weight of 2.06 ±0.2 SD. At 2 hours after birth, hypoglycemia was present in 49 (51%) babies, whereas 36 (37.5%) had hypoglycemia at 4 hours and 13 (13.5%) had at 24 hours. The majority of male babies had hypoglycemia but no statistical significance was found between gender and hypoglycemia episodes (Table 1). The majority of the babies included in the study were appropriate for gestational age (AGA) i.e.68 (70.8%) and 28 (29.1%) babies were small for gestational age (SGA). Hypoglycemia was present in a significant number of SGA babies as shown in Table 2.

**Table 1: Hypoglycemic episodes according to sex**

| *Hypoglycemia* | *Male n-51 (%)* | *Female n-45 (%)* | *P-value* |
|---|---|---|---|
| Hypoglycemia at 2 hours | 28 (54.9) | 21 (46.6) | 0.42 |
| Hypoglycemia at 4 hours | 18 (35.2) | 18 (40) | 0.63 |
| Hypoglycemia at 24 hours | 07 (13.7) | 06 (13.3) | 0.95 |

**Table 2: Hypoglycemia with respect to the gestational size**

| *Hypoglycemia* | *AGA n-68 (%)* | *SGA n-28 (%)* | *P-value* |
|---|---|---|---|
| Hypoglycemia at 2 hours | 29 (42.6) | 20 (71.4) | 0.01 |
| Hypoglycemia at 4 hours | 22 (32.3) | 14 (50) | 0.10 |
| Hypoglycemia at 24 hours | 08 (11.7) | 05 (17.8) | 0.42 |

## Discussion

Although hypoglycemia is a common neonatal metabolic complication its true incidence in low birth weight babies is not known. Neonatal blood glucose concentrations fluctuate during the first 24 hours after birth in high-risk babies and are due to abnormalities of glucose hemostasis.[9] Majority of babies in our study had hypoglycemia 02 hours after birth which was also present in Sarkar et al[8] study. In an Indian study[10], hypoglycemia was noticed 01 hour after birth both in term and low birth weight babies with a gradual rise in blood sugar levels. Rao et al[11] in their study showed that blood sugar levels could be maintained if feeding is initiated early in LBW babies which were found in our study also as episodes of hypoglycemia decreased once babies started to tolerate feed. Hypoglycemia affected both sexes equally in our study as also found by Saini[12] whereas in the study of Simchen et al the prevalence was high among males.[13]

SGA refers to a newborn with birth weight less than 10$^{th}$ centile for age and sex.[14] According to a recent epidemiological survey, a large number of babies born in low and middle-income countries consists of SGA babies which result in an increased risk of still-births and higher neonatal mortality.[15] In a Swedish study, it was found that SGA babies had high mortality outside the neonatal period as a consequence of infections and neurological problems.[16] Due to these short and long-term implications of SGA births, it has been said that more emphasis should be on preventive strategies to reduce the chances of intrauterine growth restriction. Although the risk factors for SGA vary but it has been proposed that improving maternal health and early neonatal interventions can reduce the incidence of SGA babies and decrease neonatal mortality. Liu et al[17] in their retrospective study had observed a high incidence of maternal complications and neonatal hypoglycemia in SGA babies as compared to AGA babies. Siddique et al[18] and Saini et al[12] in their comparative study had found a high incidence of hypoglycemia in SGA babies as compared to AGA babies which were consistent with our study results. Our study revealed a higher percentage of SGA babies having hypoglycemia i.e., 71.4% as compared to Siddique (50%)[17] and Saini (58.3%)[12] studies. This variability of hypoglycemia frequency may well be due to different definitions of hypoglycemia and the timing of testing of blood sugar levels done in these studies. This increased frequency of hypoglycemia in SGA babies has been attributed to associated co-morbidities, impaired glucose hemostasis, and decreased glycogen stores[19] hence showing the importance of serial monitoring of blood sugar levels. Limitations of our study were that we did not look for any associated co-morbidities and did not include babies with very low birth weight and extremely low birth weight.

## Conclusion

Hypoglycemia is the most common metabolic complication in LBW babies in the first 24 hours after birth. Early detection and treatment can prevent short-term and long-term complications. SGA has shown to be an independent risk factor of hypoglycemia in low birth weight babies.

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