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Original Research Article

Study of Blood Glucose Level in Newborns at SKMCH, Muzaffarpur, Bihar

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Abstract

Background: The three main energy substrates used by foetuses throughout development are lactate, amino acids, and glucose. One of the typical metabolic risks in the practise of newborn care is hypoglycemia. Based on AARR from 2000–2012, the anticipated newborn death rate for 2020 is 22 per 1000 live births. Some cases of unexplained newborn death may be related to neonatal hypoglycemia, which can develop as a result of prenatal starvation, birth asphyxia, postpartum hypothermia, or infection. The development of the nervous system and blood glucose levels are related.

Methods: In our study, 125 babies had their blood glucose levels measured using the glucose oxidase method both at birth and 72 hours afterwards. From December 2021 to November 2022, a cross-sectional study was carried out at pediatrics department of Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

Results: Preterm neonates had lower blood sugar levels at delivery than term neonates (63.71±15.62 and 69.38±16.53 mg/dl, respectively), although these differences were not statistically significant. However, results at 72 hours (52.61±10.50 and 67.10±10.11 mg/dl) were determined to be statistically significant. Hypoglycemia was 15.2% common.

Conclusion: The study demonstrated that hypoglycemia is a prevalent issue in preterm neonates, and that by adopting straightforward, low-cost treatments, the prevalence may be decreased, which may have a significant influence on early neonates mortality and neurological sequelae of perinatal origin.

Keywords: Hypoglycemia, Newborns.

Introduction

Based on AARR from 2000–2012, the anticipated newborn death rate for 2020 is 22 per 1000 live births [1]. Some cases of unexplained newborn death may be related to neonatal hypoglycemia, which can develop as a result of prenatal starvation, birth asphyxia, postpartum hypothermia, or infection [2]. Fetal glucose consumption increases during pregnancy, and there is a danger of hypoglycemia in both the mother and possibly the foetus, especially if there is a lengthy time between meals or at night. Furthermore, due to a lack of adipose tissue to supply alternative fuels like free fatty acids

or ketone bodies during the transition from foetal reliance to the free-living condition, premature and low birth weight newborn are more prone to hypoglycemia.

Since gluconeogenesis depends on a supply of free fatty acids for energy, the gluconeogenesis enzymes may not be active at the moment. There is not much glycerol available for gluconeogenesis, compared to what would typically be released from adipose tissue [3] By contrasting the blood glucose levels of neonates, the current study hopes to raise awareness of hypoglycemia in preterm newborns.

Material and Methods

From December 2021 to November 2022, a cross-sectional study was conducted in the pediatrics department of Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. The study comprised 125 new-born babies in total. The neonates of mothers with diabetes mellitus, gestational diabetes, preeclampsia, eclampsia, hypertension, on steroid therapy, or with major illness were excluded from this study as well as those whose newborns had congenital anomalies, major illnesses, needed intravenous glucose estimation, or died within the first three days of life.

Both the newborn's mother and father provided their written, informed consent. Mother was asked for a brief clinical history, and all the infants underwent clinical examinations, including estimates of birth weight and gestational age. Based on the moms' most recent period and the baby's physical and neurological characteristics, the Expanded New Ballard Scoring system was used to determine the neonates' level of maturity. In order to estimate blood glucose levels, cord blood was drawn immediately after birth, and cubital vein blood was drawn 72 hours later. The Glucose Oxidase technique was used to determine blood glucose levels (GOD-PAP Method).

SPSS version 20 was used to analyse the data (SPSS Inc., Chicago, IL). The t-test was used for analysis. ANOVA test was performed to compare the mean values. It was deemed important at $P<0.05$.

Result

The total number of babies examined is shown in Table 1. There were more male than female infants.

Table 1: Distribution of male and female newborns

Number of male babies	65
Number of female babies	60
Total number of newborns	125

Table 2 demonstrates that at both birth and 72 hours after birth, the blood sugar levels in low-birth-weight babies were lower than those in normal birth weight neonates. The values for these groups at birth ($p=0.10$) and at 72 hours of life ($p>0.10$), however, did not show any statistically significant link.

Table 2: Distribution of blood sugar level in low birth weight and normal birth weight newborn babies

Groups	Age of baby	No. of cases	Blood sugar(mg/dl)		SD	SE
			Range	Mean		
Low Birth Weight	Birth	43	30-100	65.32	14.00	2.13
	72 hours	43	25-94	62.88	14.44	2.20
Normal Birth Weight	Birth	82	37-145	72.06	17.45	1.92
	72 hours	82	43-95	65.60	9.74	1.07

The largest incidence of hypoglycemia was seen within 24 hours of age, as shown in Table 3.

Table 3: Incidence of hypoglycemia in relation to the age of newborns

Age of newborns in hours	0-24 hrs	24-48 hrs	48-72 hrs
Number of hypoglycemic cases	12	4	3
Percentage of hypoglycemic cases	63.15	21.05	15.78

Table 4 reveals that 19 neonates experienced hypoglycemia.

Table 4: Incidence of hypoglycemia

Total number of cases under study	125
Number of hypoglycemic cases	19
Percentage	15.20

Table 5 reveals that 9 neonates had symptoms and 19 neonates experienced hypoglycemia.

Table 5: Total number of symptomatic hypoglycemic cases

Total number of cases under study	125
Number of hypoglycemic cases	19 (15.20%)
Total symptomatic hypoglycemic cases	9 (7.2%)

According to Table 6, of the nine symptomatic instances, 8 neonates had agitation, 6 neonates had hypoxia, 5 neonates had convulsions, 3 neonates had feeding refusal and hypotonia, and 1 neonate had tachypnea and apnea.

Table 6: Signs and symptoms observed in symptomatic hypoglycemic newborns

Signs and symptoms	No. of hypoglycemic cases	Percentage
Jitteriness	8	88.88
Asphyxia	6	66.66
Convulsion	5	55.55
Refusal of feed	3	33.33
Hypotonia	3	33.33
Apnea	1	11.11
Tachypnea	1	11.11

Discussion

In the current study, low birth weight kids' blood sugar levels were lower than those of babies with normal birth weight both at birth and after 72 hours. The values of these two groups at birth and at 72 hours of life did not, however, show any statistically significant association. According to Bhalla M *et al*., term newborns had a group mean value of 47.2 mg% while preterm babies had a mean value of 39.8 mg% [4]. In this study, preterm babies' blood sugar levels at delivery were lower than those of term neonates (mean 63.71 mg/dl) and at 72 hours of age, term neonates blood sugar levels were significantly higher than those of preterm babies (mean 52.61 mg/dl).

In a study by Linda LW *et al* [5] plasma glucose levels were evaluated throughout the first day of life in 24 SGA infants who began formula feedings or breast milk feeding within 2 hours of birth. No newborn had a plasma glucose level below 30 mg/dl, and after the first feeding, no readings below 40 mg/dl occurred, in contrast to the significant incidence of low blood sugar previously observed in fasted SGA infants. According to

the findings, hypoglycemia (plasma glucose <40 mg/dl) in SGA infants can be readily avoided by immediately giving them enough food after delivery.

In the current study, blood glucose levels in AGA newborns were greater at birth and even at 72 hours than in SGA babies. Additionally, 13 cases of AGA newborns and 6 cases of SGA babies also experienced hypoglycemia. Similar to their study, this one highlights the importance of eating early to prevent hypoglycemia in the future.

Neonatal deliveries by caesarian section had a 43% incidence of hypoglycemia, compared to vaginal deliveries, which had a 37% incidence, according to Cole MD and Peevy K [6] In this study, the distribution of blood sugar levels in babies born normally (via vaginal delivery) and those born via caesarian section revealed that, at birth, the blood sugar levels of babies born normally were, on average, statistically significantly lower than those of babies born via caesarian section (mean 74.57 mg/dl). When compared to caesarian babies, normal delivery babies' blood sugar levels rose from birth to 72 hours of age.

However, there was no statistically significant difference between the levels of these two groups at 72 hours (mean 64.43 mg/dl in regularly born babies vs. 64.98 mg/dl in caesarian babies). In 5 (7.04%) of the newborns delivered naturally and 14 (25.92%) of the babies delivered via caesarian section, hypoglycemia was seen. In connection to the duration of labour, Kim G and Chul Y [7] assessed the mother's and foetus' blood glucose levels. They discovered that the mother's blood glucose level remained unaffected by the length of labour.

However, the fetus's blood glucose level tended to increase for up to 20 hours before falling off after that. There was no statistically significant link between the blood sugar levels at birth of babies born in this study who had undergone regular labour (mean 65.43 mg/dl) and those born who had undergone protracted labour (mean 69.43 mg/dl).

Blood sugar levels in newborns who had undergone a typical labour were lower at 72 hours of age than those in newborns who had undergone an extended labour. Still, that is not statistically significant either. This study demonstrates that blood glucose levels dramatically rise from the time of birth to 72 hours during prolonged labour. This outcome conflicts with their observations and was likely brought on by the newborn's stress throughout the lengthy delivery.

Blood sugar levels were shown to be considerably higher in infants weighing 2250 g or more, as well as in infants whose gestational ages were over 37 weeks, according to research by Mishra PK *et al* [8]. The larger and smaller twin's mean sugar values were the same, and neither their birth order nor sex had any bearing on the readings. Seven infants (7%) had significant hypoglycemia (blood sugar <20 mg%) in the smaller twin (70%). The current study demonstrates that during birth, the first baby's blood sugar level was greater than that of the second baby (mean 63.37 mg/dl), with larger newborns having higher blood sugar levels than smaller babies, although there was no statistically significant association. At 72 hours of age, the first infant's blood sugar levels (mean 72.36 mg/dl) were also higher than the second baby of the twins (mean 65.60 mg/dl), however this difference was not statistically significant. The outcomes corroborated their observations. According to Cornblath M and Schwartz R [9] hypoglycemia affects 5% to 7.9% of term newborns and 3.5% to 15% of preterm infants on average.

Hypoglycemia manifested in 19 cases (15.20%) of the study group in the current investigation. In a study by Fato T *et al*.,[10]

glucose levels in all 35 infants were assessed at the first, second, and third hours as well as 14, 24, 36, and 48 hours prior to feeding. In the first three hours of life, blood glucose levels were at their lowest.

There were 12 newborns with blood glucose levels below 30 mg/dl in the first three hours of life, although only three of those (or 9%) required treatment because the hypoglycemia persisted. The largest incidence of hypoglycemia (63.15%) in the current study happened within 24 hours. Between 24 and 48 hours, 21.05%. 15.78% of instances with a delay of 48 to 72 hours still exist.

The findings of this study, which are comparable to those of Holtrop PC [11] and Fato T *et al* [10] but disagree with those of Linda LW *et al*, point to the importance of early feeding in preventing hypoglycemia in the future [5]. Because of metabolic immaturity, symptomatic hypoglycemia is linked to a risk of long-term neurodevelopmental consequences, according to Lucas A *et al*. Preterm babies and babies that are small for gestational age were found to be more susceptible to sequelae. [12]

Only 50% of 85 newborns with symptomatic hypoglycemia in a study by Koivisto M *et al* [13] reported with convulsions, while 88% of those with non-convulsive symptoms had developmentally normal signs. Only 9 (47.36%) of the 19 patients in the current study had symptoms. Of the newborns with symptoms, 8 (88.88%) showed agitation, 6 (66.6%) asphyxia, 5 (55.55%) convulsion, 3 (33.33%) hypotonia and feed refusal, and 1 (11.11%) apnea and tachypnea.

Conclusion

It is advised to check neonates blood sugar levels before the onset of clinical signs and symptoms in order to avert the consequences of hypoglycemia.

References

1. Sankar MJ, Neogi SB, Chauhan M, Srivastava R, Prabhakar PK, Khera A, *et al*. State of newborn health in India. J Perinatol 2016; 36:3-8.
2. Ashworth A, Waterlow JC. Infant mortality in developing countries. Arch Dis child 1982; 57:882-4.
3. David AB, Peter AM. Gluconeogenesis and control of blood glucose. In: Murray RK, Granner DK, Rodwell VW, editors. Harper's Illustrated Biochemistry. 27th ed. New York: McGraw-Hill; 2006. p. 167-76.
4. Bhalla M, Sribastava JR, Bhalla JN, Sinha DN, Sur BK. A study of blood glucose level in the newborn-from birth to 7 days. Indian J Pediatr 1978; 45:11-7.
5. Linda LW, Charles AS, Endla KA, Lester B. The effect of early feeding on plasma glucose levels in SGA infants. Clin pediatr 1983;22(8):539-41.
6. Cole MD, Peevy K. Hypoglycemia in normal neonates appropriate for gestational age. J Perinatol 1994; 14:118-20.
7. Kim G, Chul Y. The maternal and fetal glucose levels during labor. Korean Medical Database 1970;13(1):15-21.
8. Mishra PK, Sethi RS, Sharma D. Blood sugar level in twin neonate. Indian J Pediatr 1984; 51:661-3.
9. Cornblath M, Schwartz R. Hypoglycemia in the neonate. J Pediatr Endocrinol 1993; 6:113-29.
10. Fato T, Nursel Y, Hidayet Y, Dilara I. Blood glucose levels and hypoglycemia in full term neonates during the first 48 hours of life. J Trop Pediatr 1997;43(1):58-60.
    Holtrop PC. The frequency of hypoglycemia in full-term large and small for gestational age newborns.
    Am J Perinatol 1993; 10:150-4.
11. Lucas A, Morley R, Cole TJ. Adverse neurodevelopmental outcome of

moderate neonatal hypoglycemia. Br Med J 1988; 297:1304-8.
12. Koivisto M, Blancosequeiros M, Krause U. Neonatal symptomatic and asymptomatic hypoglycemia: a follow-up study. Dev Med Child Neurol 1972; 14:603-14.