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A STUDY ON HYPOGLYCEMIA AND ITS CLINICAL PROFILE IN VERY LOW BIRTH WEIGHT NEONATES

Paediatrics Medicine

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ABSTRACT

Background: Neonatal hypoglycemia is a common metabolic disorder in very low birth weight (VLBW) neonates, often leading to significant morbidity and mortality. VLBW neonates are particularly vulnerable due to their limited metabolic reserves and associated comorbidities. This study aims to determine the incidence, clinical profile, and short-term outcomes of hypoglycemia in VLBW neonates admitted to a tertiary care hospital in West Bengal, India. **Methods:** This institution-based observational prospective study was conducted in the Sick Newborn Care Unit (SNCU) of Bankura Sammilani Medical College and Hospital from December 2022 to May 2024. A total of 110 VLBW neonates (birth weight 1000–1499 g) were included based on predefined inclusion and exclusion criteria. Data were collected through clinical assessments, laboratory investigations, and medical records. Hypoglycemia was defined as blood glucose levels <40 mg/dL. Statistical analysis was performed to evaluate the association between hypoglycemia and various factors, including gestational age, gender, mode of delivery, and neonatal sepsis. **Results :** The incidence of hypoglycemia among VLBW neonates was 15.45%.Very preterm neonates (gestational age 28–<32 weeks) had the highest incidence of hypoglycemia (20.51%). Among hypoglycemic neonates, 76.47% were symptomatic, with jitteriness (29.41%) being the most common symptom, followed by hypothermia (23.53%), seizures (11.76%), and lethargy with refusal to feed (11.76%). A strong association was observed between hypoglycemia and neonatal sepsis, with 64.71% of hypoglycemic neonates testing positive for sepsis screen. The mortality rate among hypoglycemic VLBW neonates was 35.29%, with all deceased neonates being very preterm, and having associated sepsis. **Conclusion:** Hypoglycemia is a significant contributor to morbidity and mortality in VLBW neonates, particularly in preterm infants and those delivered via cesarean section. Early identification and management of hypoglycemia, along with improved aseptic measures in neonatal intensive care units, are essential to reduce neonatal mortality and prevent long-term neurological sequelae.

KEYWORDS

Neonatal hypoglycemia, very low birth weight, preterm neonates, neonatal sepsis, morbidity, mortality

INTRODUCTION:

Neonatal hypoglycemia is a preventable cause of neurological sequelae. Very low birth weight babies are especially vulnerable due to their lack of metabolic reserves and associated co-morbidities. Hypoglycemia is one of the most common causes of mortality and morbidity in neonates, especially in high-risk babies like very low birth weight babies. VLBW mortality varies from 14.8 % to 40.9% [(1)]. Incidence of hypoglycemia in low-birth weight babies is 30% [(2)]. However, there is no sufficient data regarding the incidence and outcome of hypoglycemia in VLBW in this part of our state. Neonatal hypoglycemia often goes unnoticed due to a lack of specific symptoms [(3)]. Knowing the incidence of hypoglycemia and its clinical profile, outcome in VLBW neonates will help in planning measures to reduce the neonatal mortality and morbidity.

AIMS AND OBJECTIVES:

i) To determine the occurrence of hypoglycemia in very low birth weight babies.

ii) To evaluate the clinical profile and short-term mortality of very low birth weight babies according to their glycemic status

MATERIALS AND METHODS:

A total of 110 neonates with VLBW were screened for hypoglycemia and evaluated during their SNCU stay from December 2022 to May 2024 in SNCU of Bankura Sammilani Medical College and Hospital, Bankura. A written consent was obtained before study.

Inclusion Criteria:

1. Neonates weighing 1000gm to 1499 gm at birth.

Exclusion Criteria-

1. Birth Weight more than or equal to 1500g
2. Birth weight less than 1000g
3. Neonates with severe congenital anomalies.
4. Those not willing to take part in this study

Study Techniques –

I Review of records.

II Clinical assessments of babies.

Study Variables-

> sex distribution
>birth weight of neonate
> Clinical manifestations
  * Refusal of feed
  * Respiratory Distress
  * Lethargy
  *Hypothermia/ hyperthermia
  * Convulsion
> Laboratory investigation
  * Capillary blood glucose
  * Blood glucose estimation by standard glucose oxidase method.

Very Low Birth Weight (VLBW) is defined as birth weight between 1000-1499gm[(4)].

Neonatal hypoglycemia is defined as blood glucose level less than 40mg/dL, as per WHO definition[(5,6)].

Relevant investigations were carried out when indicated. These include:

- Random blood glucose
- Platelet count, Total and differential WBC count (thousand/cmm)
- Micro ESR, CRP
- CHEST X RAY
- CSF STUDY (Pathological, microscopic, biochemical)
- Blood culture and sensitivity
- Urine routine and microscopic examination &Urine culture with antibiotic sensitivity.

Statistical Analysis Plan

- Data was analyzed using appropriate statistical tests. The statistical analysis was carried out using available standard statistical software (SPSS 25 version).
- The comparison of normally distributed continuous variables between the groups was done using Student's T test.
- Nominal categorical data between the groups was compared using Chi-squared test.
- P value <0.05 was considered significant

RESULTS:

The incidence of hypoglycemia among VLBW neonates was 15.45%. No statistical significance was found in the onset of neonatal hypoglycemia [peak occurrences at 6 hours (29.41%) and 48 hours (29.41%) after birth]. There is no statistically significant association between gender and mode of delivery. Very preterm neonates (gestational age 28–<32 weeks) had the highest incidence of hypoglycemia (20.51%). Among hypoglycemic neonates, 76.47% were symptomatic, with jitteriness (29.41%) being the most common symptom, followed by hypothermia (23.53%), seizures (11.76%), and lethargy with refusal to feed (11.76%). A strong association was observed between hypoglycemia and neonatal sepsis, with 64.71% of hypoglycemic neonates testing positive for sepsis screen. All of the patients who developed hypothermia, and all those presenting with lethargy and refusal to feed as a symptom of hypoglycemia also had an associated neonatal sepsis. Among those having Jitteriness, 3 (60%) had associated sepsis. Two patients had seizures and they were also positive in sepsis screen. The mortality rate among hypoglycemic VLBW neonates was 35.29%, with all deceased neonates being very preterm, and having associated sepsis.

DISCUSSION:

We incorporated 110 very low birth weight neonates, with a mean birth weight of 1260gm in our study, with the aim of eliciting the incidence and clinical profile of hypoglycemia in them. Notably, 15.45% of the total cases studied exhibited hypoglycemia. We documented 76.47% of hypoglycemic neonates to be symptomatic, and 23.53% to be asymptomatic. Most common symptom noted was jitteriness (29.41%), followed by hypothermia, seizure, lethargy and refusal to feed. Additionally, positive sepsis screen was documented in 64.71% (11 out of 17) of the hypoglycemic VLBW neonates in the study. The symptoms of hypothermia, seizures and lethargy with refusal to feed in hypoglycemic neonates were entirely associated with a positive sepsis screen. Amongst those having jitteriness, 60% had a positive sepsis screen. The study witnessed a 35.29% mortality amongst the hypoglycemic VLBW neonates, with the remaining 64.71% being discharged successfully. Another significant finding in the study was that, the neonates who expired were very preterm, born between 28 weeks to <32 weeks of gestational age, they all developed sepsis in the course of management as evidenced by sepsis screen.

Table 1: Distribution Of Mean Birth Weight Of The Study Population (n=110)

No of Sample	Mean of Birth Weight(gm)	max Birth Weight(gm)	Min Birth Weight(gm)
110	1260	1498	1003

Table 2: Distribution Of Neonates According To The Onset Of Hypoglycemia.

Hypoglycemia	Frequency
<6 hrs	8
6- 12 hrs.	1
>12- 24 hrs.	3
>24hrs	5
Grand Total	17

P- value : 0.0979 (Statistically insignificant)

Table 3: Gender Distribution Of Hypoglycemic Neonates Of Study Population

Gender	Frequency	Incidence Of Hypoglycemia	Percentage
FEMALE	48	7	14.58
MALE	62	10	16.13

P value : 0.825 (Not significant)

Table 4: Distribution Of Mode Of Delivery Of Hypoglycemic Neonates Of The Study Population.

Mode of Delivery	Frequency	Hypoglycemia Incidence	% of Hypoglycemia
Caesarean Section	83	15	18.07
Vaginal	27	2	7.4
Total	110	17	

p- value: 0.176 (Statistically not significant)

Table 5: Distribution Of Gestational Age (GA) Of The Hypoglycemic Neonates Of Study Population

GA Category	Frequency	%
EXTERME PRETERM	1	5.88
VERY PRETERM	8	47.06
MODERATE PRETERM	2	11.76
LATE PRETERM	6	35.29
Grand Total	17	

p-value: 0.021(Statistically significant)

Table 6: Distribution Of Symptoms Of Hypoglycemia

Symptoms	Frequency	Percentage
Asymptomatic	4	23.53
Hypothermia	4	23.53
Lethargy & Refusal to Feed	2	11.76
Jitteriness	5	29.41
Seizure	2	11.76

Table No 7: Distribution Of Associated Sepsis In Neonates With Hypoglycemia Of The Study Population

Associated sepsis	Frequency	%
No	6	35.29
Yes	11	64.71
Grand Total	17	

P-value: <0.001 (Highly significant)

Table No 8: Distribution Of Sepsis Along With Symptoms Of Hypoglycemia In Study Population.

Symptoms	Frequency	SEPSIS	% of SEPSIS
Asymptomatic	4	0	0
Hypothermia	4	4	100
Lethargy & Refusal to feed	2	2	100
Jitteriness	5	3	60
Seizure	2	2	100

p-value: 0.015 (Statistically significant)

Table No 9: Distribution Of Death In Hypoglycemic Neonates Of The Study Population

Death	Frequency	%
No	11	64.71
Yes	6	35.29
Grand Total	17	

p-value: <0.001 (Highly significant)

Table 10: Distribution Of Gestational Age With Death Among The Hypoglycemic Neonates Of The Study Population

Death	<28 week	28 to 31weeks	32 to 33wks.	34 to 36wks.	More than 36 wks.
No	1	2	2	4	2
Yes	0	6	0	0	0

P-value: 0.007 (Statistically significant)

Table 11: Distribution Of Death With Associated Sepsis In Hypoglycemic Neonates Of The Study Population

DEATH	NO SEPSIS	SEPSIS
NO	6	5
YES	0	6

P-value: 0.027(Significant)

CONCLUSION:

Very low birth weight is a pivotal determinant of hypoglycemia and ensuing morbidities in neonates.

A strong correlation has been noted between preterm birth and hypoglycemia, and the eventual infant mortality. The study emphasizes the need for an antenatal initiative to ameliorate the burden of preterm deliveries by focusing on maternal nutrition, regular antenatal follow-ups and identification of high-risk mothers.

Identification of neonatal hypoglycemia is crucial for preventing resultant morbidities and mortalities. The present study exhibits the symptoms of hypoglycaemia to be non-specific, with a large section remaining asymptomatic. For the symptoms documented, hypoglycemia cannot be viewed as the only cause. Also, it is necessary to screen the asymptomatic cases for hypoglycemia until a required point of time.

Hypoglycemia and sepsis have shown a strong association with each other, and collectively with the infant mortality. It is difficult to derive from this whether the symptoms noted for hypoglycemia could partly or mostly be ascribed to the sepsis component. Additionally, the findings call for a sepsis screen for all hypoglycemic neonates, and also warrant the maintenance of an aseptic environment for the neonates, constituting steps like minimal handling, proper hand hygiene, creation of awareness among all staff in the nursery with a view to improving asepsis protocol of NICU.

Hypothermia was also noted to be one of the most common symptoms. Hypoglycemia and hypothermia are interlinked in neonates. Since in VLBW neonates, sepsis manifests more frequently as hypothermia rather than fever, both screening for hypothermia and maintenance of a thermoneutral environment are of utmost importance for these neonates.

Limitation Of The Study

A good proportion of the study population inadvertently developed sepsis in the course of management thereby posing as a confounding factor. A better nursery care with proper maintenance of aseptic measures could have a better view.

The study is a single centered study, a multicentric study could have better delineated the outcome, which could better represent the reality.

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