

A Hospital Based Prospective Study to Determine the Clinical Profile of Low Birth Weight Neonates Presenting with Hypoglycemia

Nishant¹, Hemant Kumar Thakur²

¹Assistant Professor, Department of Paediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

²Assistant Professor, Department of Paediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

Received: 04-09-2021 / Revised: 29-09-2021 / Accepted: 18-10-2021

Corresponding author: Dr. Hemant Kumar Thakur

Conflict of interest: Nil

Abstract

Aim: Study of hypoglycemia in neonates with low birth weight

Methods: A total of 100 infants were included in the study. They were divided into two groups with infants with hypoglycemia in one group and infants with normoglycemic in another group. Lethargy, jitteriness and seizures, tremor, apnea, poor feeding, etc were considered to be clinical signs of hypoglycemia if they were unexplained by other diagnoses and corrected with the provision of glucose. Infants were considered asymptomatic if low plasma glucose concentration was not associated with clinical signs.

Results: A total of 100 neonates were included in the study. The age of the mother of the neonates included in the study was of age ranged from 22 to 35 years. The mean age of the mother was 30 ± 5 years. A total of 40 mothers age ranges of 22 to 27 years, there were 35 mothers in the age range of 28 to 31 years and there were 25 women with the age of more than 31 years. The majority of the infants were born to the mother age range 22 – 27 years. There was no significant association between the age of the mother and hypoglycaemia. Out of the total 100 neonates, a total of 75 neonates were normoglycemic and 25 neonates had hypoglycaemic episodes. Overall, 25 episodes of hypoglycemia were recorded. There was no significant association between birth weight and episodes of hypoglycemia. The majority of hypoglycaemic infants were male. There was no significant association between gender and episodes of hypoglycemia. The majority of hypoglycaemic infants were born with low birth weight. There was no significant association between birth weight and episodes of hypoglycemia.

Conclusion: Small for gestational age is a significant determinant for hypoglycemia. Hypoglycaemic episodes were significantly noticed in the first 24 hours as compared to another time interval.

Keywords: hypoglycaemia, gestational age, low birth weight.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Low birth weight (LBW) has been defined by World Health Organization (WHO) as a birth weight of an infant of 2499gm or less, regardless of gestational age [1]. Annually 6 to 8 million low birth weight infants are born in India [2]. There is high incidence of low-birth-weight babies in our country, intra uterine growth retardation (small for date) accounts for higher number of low-birth-weight babies rather than preterm babies. The most important marker for adverse perinatal and neonatal outcome is the birth weight. There is increased risk of mortality among low birth weight by 2-3 times as compared to normal birth weight babies due to infection. There is three times more risk of developing neurodevelopmental sequelae of birth asphyxia in low-birth-weight babies as compared to normal weight babies. In babies with birth weight of less than 1800 g or babies born before 35 weeks of gestation have inactivity, lethargy and uncoordinated sucking and swallowing which is due to immaturity of central nervous system. The poor hepatic glycogen stores, delayed feeding, respiratory distress syndrome and birth asphyxia further lead to development of hypoglycemia [2].

Low birth weight babies have high risk of developing hypoglycemia, hypocalcaemia, acidosis hypoxia and hypoproteinaemia. The clinical problems and outcomes of small for gestational age babies are very difficult as compared to preterm babies. Symptomatic hypoglycemia, birth asphyxia, polycythemia, congenital malformations and pulmonary hemorrhage is more common in term small for gestational age babies as compared to preterm small for gestational age babies. Other problems like hyaline membrane disease, apnoeic attacks, inability to suck and swallow, aspiration of feeds, junctional obstruction, enterocolitis, hypothermia, hyperbilirubinemia, susceptibility to infections and intraventricular hemorrhage is more common in preterm small for

gestational age babies as compared to small for gestational age babies [2].

There is high incidence of metabolic derangements in newborn babies especially among preterm infants, due to physiological and biochemical immaturity. Hypoglycemia is historically one of the most metabolic problems seen in both the new-born nursery and neonatal intensive care unit.

Operational threshold has been defined as BGL of less than 40 mg/dL (plasma glucose level less than 45 mg/dL) [2,3].

Hypoglycemia occurs in about 15% of small for gestational age babies [2]. It generally manifests between 24 hours to 72 hours and is preventable by early feeding. There are direct correlations between blood glucose levels, gestational maturity and birth weight of the baby. The low hepatic glycogen stores and high incidence of hypoxia, hypothermia and respiratory distress syndrome contribute to hypoglycemia. The incidence of hypoglycemia is higher in babies with a birth weight of less than 50th percentile for gestational age up to 15% in small for gestational age infants and in preterm babies varies between 5 to 10%. Hypoglycemia is common following severe birth asphyxia, hypothermia, septicemia and polycythemia.

The clinical report, from the APP committee on fetus and Newborn, offered a practical guide for the screening and subsequent management of neonatal hypoglycemia in at-risk late preterm (34-36 weeks) and term infants, but with a number of cautions about the lack of supporting evidence. Screening for and treating low neonatal blood glucose levels should only be done in newborns known to be at risk for neonatal hypoglycemia [4]. We therefore propose to study clinical profile of low-birth-weight babies with reference to occurrence of hypoglycaemia.

Material and Methods

This Descriptive observational study conducted in the Department of Paediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India for 12 months.

Methodology

The neonates with a weight of fewer than 2500 grams were included in the study. Whereas the mother of the neonates diagnosed with diabetes, birth asphyxia, presence of endocrine deficiencies, and the presence of congenital malformations was excluded from the study. A total of 100 infants were included in the study. They were divided into two groups with infants with hypoglycemia in one group and infants with normoglycemic in another group. Lethargy, jitteriness and seizures, tremor, apnea, poor feeding, etc were considered to be clinical signs of hypoglycemia if they were unexplained by other diagnoses and corrected with the provision of glucose. Infants were considered asymptomatic if low plasma glucose concentration was not associated with clinical signs. All neonates were weighed at birth with an electronic weighing machine with an accuracy of $\pm 5g$. The gestational assessment was done by the new Ballard score. Neonates were managed as per the standard protocol. Asymptomatic hypoglycemia was first treated by adjusting the enteral feeding regimen. If this approach failed, intravenous therapy was instituted. For the collection of the sample, the aseptic condition was maintained, and with the help of heel prick, the capillary blood was collected. The venous blood was also collected. The capillary blood was screened with the help of reagent strips. The venous blood was also sent for a detailed laboratory investigation. The autoanalyzer was used for the investigation of the venous glucose level. For the statistical analysis, the data were presented in the form of statistical tables and charts. SPSS software version 20 was used for the statistical analysis of the study.

Results

The present study was done to study the clinical profile of low-birth-weight babies concerning the occurrence of hypoglycemia. A total of 100 neonates were included in the study. The age of the mother of the neonates included in the study was of age ranged from 22 to 35 years. The mean age of the mother was 30 ± 5 years. A total of 40 mothers age ranges of 22 to 27 years, there were 35 mothers in the age range of 28 to 31 years and there were 25 women with the age of more than 31 years. The majority of the infants were born to the mother age range 22 – 27 years. There was no significant association between the age of the mother and hypoglycemia (Table 1).

Out of the total 100 neonates, a total of 75 neonates were normoglycemic and 25 neonates had hypoglycaemic episodes. Overall, 25 episodes of hypoglycemia were recorded. There was no significant association between birth weight and episodes of hypoglycemia. The majority of hypoglycaemic infants were male. There was no significant association between gender and episodes of hypoglycemia. The majority of hypoglycaemic infants were born with low birth weight. There was no significant association between birth weight and episodes of hypoglycemia. (Table 2)

A total of 25 neonates were found to be hypoglycaemic, of which there were 20 neonates with small gestational age and 5 neonates were of appropriate age. The difference was found to be statistically significant. Hypoglycemia was more common in small for gestational age infants. When the blood group was assessed in the infants, the majority of hypoglycemic infants had O+ blood group. However, there was no significant association between baby blood group and episodes of hypoglycemia ($P = 0.17$).

Table 1: Distribution of study participants according to Age groups.

Age of the mother (Years)	Number	Percentage
22-27	40	40
28-31	35	35
More than 31 years	25	25
Total	100	100

Table 2: Distribution of Neonates according to Glycemic Status.

Glycemic status of Neonates	Number	Percentage
Normoglycemic	75	75
Hypoglycaemic	25	25
Total	100	100

Discussion

Hypoglycemia essentially results from either decreased production or excessive utilization of glucose reserves. Thus, hypoglycemia occurs in a neonate who is born with low glycogen and fat stores with limited capacity to generate glucose via the gluconeogenesis pathway or excessive peripheral tissue utilization of glucose like in an infant of a mother with insulin-dependent diabetes [5]. Hypoglycemia associated with abnormal clinical signs (symptomatic hypoglycemia) has a poor short- and long-term outcome but evidence of risk in the absence of clinical signs (asymptomatic hypoglycemia) is inconclusive. The diagnosis and management of hypoglycemia depend mostly on the cause and severity of hypoglycemia, the clinical presentation, and the underlying etiology. Thus, the treatment plan should be individualized for each infant [6]. In our present study, the incidence of hypoglycemia in the low weight neonates was found to be 25%. In the literature different studies have reported the different incidents. In the study done by Dias E and Gada S [7] they reported that the incidence of hypoglycemia found to be 17%, and in the study done in Jonas D et al [8].

In the present study, the weight of neonates ranged from 600 g to 2600 g. The mean birth weight of neonates was found to 1900 g. In the literature, various studies are

reporting varying weight distribution. The study done by Budhathoki S et al [9] reported the mean weight to found to be 1600

g. The present study correlating with hypoglycemia depicted that out of 24 hypoglycemic infants 58.3% were low birth weight, 41.7% were very low birth weight. But no significant association was found. (p-value >0.05). Similarly, Hawdon JM et al [10] stated the most common risk factor for hypoglycemia was low birth weight or borderline low birth weight. When the distribution of the infants was done as per the hypoglycaemic status and also the gestational age; it showed that hypoglycaemic episodes are more common in the gestational age of 34 to 36 months. Narayan S et al studied that hypoglycemia was encountered in a variety of neonatal conditions among that prematurity was one. In the present study, out of 100 infants, the normal vaginal delivery was done in 55 infants and in 45 infants the delivery was done by lower segment cesarean section. In the study done by Dias E and Gada S [7], they concluded that mode of delivery is one of the determinants of hypoglycaemia.

Conclusion

Small for gestational age is a significant determinant for hypoglycemia. Hypoglycaemic episodes were significantly noticed in the first 24 hours as compared to another time interval.

Reference

1. World Health Organization, International statistical classification of diseases and related health problems' tenth revision. World Health Organization, Geneva; 1992.
2. Singh M. Care of the new-born. 8th ed. New Delhi: CBS Publishers; 2015:299-18.
3. Cloherty JP, Eichenward EC, Hansen AR, Stark AR. Manual of neonatal care. 7th ed. New Delhi; 2011:340.
4. American academy of paediatrics. Issue guide for neonatal hypoglycaemia. 2011.
5. Sperling MA, Menon RK. Differential diagnosis and management of neonatal hypoglycemia. *Pediatr Clin.* 2004;51(3)703-723.
6. Greeley SAW, Tucker SE, Naylor RN, Bell GI, Philipson LH. Neonatal diabetes mellitus: a model for personalized medicine. *Trends Endocrinol Metabol.* 2010;21(8)464-472.
7. Dias E, Gada S. Glucose levels in newborns with special reference to hypoglycemia- a study from rural India. *J Clin Neonatol.* 2014;3(1)35-38.
8. Jonas D, Dietz W, Simma B. Hypoglycemia in newborn infants at risk. *Klinische Pädiatrie.* 2014;226(5) 287-91.
9. Saini A, Gaur BK, Bhalla AS, Antil PK, Maini B, Bharadwaj AK. Clinical Profile of Low-Birth-Weight Neonates Admitted in NICU- A Hospital Based Study. *J Med Sci Clin Res.* 2019;7(1).
10. Hawdon JM, Beer J, Sharp D, Upton M. Neonatal hypoglycaemia- learning from claims. *Arch Dis Child Fet Neonatal Ed.* 2017;102(2)F110-F5.