



Study on Screening of Blood Glucose Levels in Exclusively Breast Fed Lbw Babies and High-Risk Babies in A Tertiary Care Center in Western Up

Dr. Abdur Rahman ^{1*}, Dr. Yogesh Kumar Goel ², Dr. Bhawana Kohli ³, Dr. Hiru Navaney ⁴, Dr. Vivek Tyagi ⁵, Dr. Neha Kumari ⁶

¹ Department of Pediatrics, Saraswathi Institute of Medical Sciences, Uttar Pradesh, India

² Professor and Head, Department of Pediatrics, Saraswathi Institute of Medical Sciences, Uttar Pradesh, India

^{3,4} Professor, Department of Pediatrics, Saraswathi Institute of Medical Sciences, Uttar Pradesh, India

⁵ Assistant Professor, Department of Pediatrics, Saraswathi Institute of Medical Sciences, Uttar Pradesh, India

⁶ Senior Resident, Department of Pediatrics, Saraswathi Institute of Medical Sciences, Uttar Pradesh, India

* Corresponding Author: Dr. Abdur Rahman

Article Info

ISSN (online): 2582-8940

Volume: 05

Issue: 04

October-December 2024

Received: 02-10-2024

Accepted: 06-11-2024

Page No: 108-110

Abstract

Introduction: Exclusive breastfeeding is universally recommended for newborns due to its numerous benefits. However, high-risk infants, such as those with low birth weight or born to diabetic mothers, are susceptible to neonatal hypoglycemia, necessitating careful monitoring and sometimes supplemental feeding.

Objectives: This study aimed to assess blood glucose patterns in exclusively breastfed low birth weight and high-risk infants within the first 48 hours of life. Specific objectives included evaluating incidence rates of hypoglycemia in these populations and documenting the duration of exclusive breastfeeding up to six months.

Methods: A prospective observational study was conducted over two years at Saraswathi Institute of Medical Sciences, involving 160 infants meeting inclusion criteria. Blood glucose levels were monitored at specified intervals using AccuSure Pro Glucometer, with data collected through punctured heel blood samples.

Results: Among the 160 infants studied, 55.4% of low birth weight infants and a significant portion of high-risk infants experienced hypoglycemia within the first 48 hours. Factors such as birth weight, gestational age, and maternal health significantly influenced glucose levels.

Conclusion: The study highlights the prevalence of hypoglycemia in exclusively breastfed high-risk newborns, emphasizing the need for targeted monitoring and early intervention strategies to optimize neonatal health outcomes.

Keywords: Exclusive breastfeeding, hypoglycaemia, low birth weight, high-risk infants

Introduction

Because of the benefits to both the baby and the mother, exclusive breastfeeding has become universally advised for all newborn babies around the world. Despite having relatively little breastmilk in the first 2 days of life, term newborns can maintain adequate glucose homeostasis due to normal up-regulation of hormonal and metabolic pathways following birth. Thus, systematic screening for the hypoglycemia is not suggested in term neonates ^[1-4].

Neonatal hypoglycemia is particularly common in high-risk neonates, such as small for gestational age (SGA), diabetic mothers' infants, large for gestation, and late-preterm neonates ^[5,6]. Caregivers are skeptical that high-risk newborns can be supported on exclusive breast feeding, particularly in the first 48-72 hours, and frequently recommend supplemental feeding. This is demonstrated by low rates of exclusive breast feeding within the first hour, even in the hospital setting ^[7,8]. A small infant might lack the ability to suck, and which may cause incoordination between sucking and swallowing, resulting in impaired nutrition and, subsequently, hypoglycemia. As a result, high-risk neonates require regular and recurrent screening for neonatal

hypoglycemia, which is associated with bad neurological outcomes [9, 10].

Though the incidence of hypoglycemia in the high risk population is widely reported [5, 6, 11], its incidence in exclusively breastfed high risk babies is mainly unclear. We therefore planned this study with the purpose of determining the incidence of hypoglycemia in exclusively breastfed high risk newborns within the first 48 hours of life. We also planned to follow these babies for six months and document the duration of exclusive breastfeeding in these high-risk neonates

Materials and Methods

The study was conducted in the Department of Paediatrics at Saraswathi Institute of Medical Sciences, Hapur. UP. In all Low birth Weight babies and high risk babies who are prone to develop hypoglycemia from September 2022 to June 2024 It was Prospective observational Study Pre-test counselling was offered to all families which includes verbal counseling along with written informed consent of Parent/Guardians.

Babies in postnatal ward with mothers who are exclusive breastfeeding and are –Low birth weight infants between 1800 - 2500 gms. Babies (high risk) if Infants of diabetic mother. Small for gestational age. Late preterms. Large for gestational age were included

Neonates requiring admission in NICU. apgar score <5 at 5 min IV. Fluids, congenital malformations Documented hypoglycaemia not responding to oral feeding only for 1 hour and Mother who cannot breast feed due to maternal illness were excluded.

Blood glucose was monitored at 1,2, 6,12, 24, and 48 hours of life

All infants were breast fed on demand but ensured at least 8-10 feeds in 24hrs. All babies were breast fed if they have a good suck; else expressed breast milk(EBM) will be given by katori spoon. Blood glucose testing was performed by puncturing the skin of the heel and collecting a drop of blood. The sample was applied to a glucose test strip and analyzed by AccuSure Pro Glucometer (TD- 4252) The data collected will be entered in Microsoft Excel and will be imported in IBM SPSS v 25.0. The data was analyzed by appropriate statistical techniques & tests such as mean $\pm$ standard deviation (SD) or paired t-test, graphical representation of data, frequency distribution, etc. A p value less than 0.05 was taken statistically significant

Results

In this study, the distribution of euglycemia and hypoglycemia among exclusively breastfed low birth weight (LBW) and normal birth weight infants was analyzed. Among the LBW infants, 46 exhibited euglycemia, whereas 37 experienced hypoglycemia. In contrast, among the normal birth weight infants, 71 were euglycemic, while only 6 showed hypoglycemia. The difference in glucose levels between the two groups was statistically significant, with a chi-square value of 22.5 and a p-value of 0.001.

Table 1

Hour of Life	LBW	Normal	P value
1 hour	53.0 $\pm$ 17.5	60.9 $\pm$ 16.0	0.024*
2 hours	51.7 $\pm$ 18.3	59.7 $\pm$ 17.2	0.034*
6 hours	52.4 $\pm$ 23.2	62.5 $\pm$ 21.5	0.033*
12 hours	59.4 $\pm$ 25.9	70.9 $\pm$ 24.3	0.03*
24 hours	64.6 $\pm$ 26.2	76.2 $\pm$ 24.5	0.03*
48 hours	81.4 $\pm$ 28.2	93.9 $\pm$ 26.1	0.029*

The study examined the incidence of euglycemia and hypoglycemia among high-risk and no-risk infants. Among the high-risk infants, 61 were euglycemic, while 35 experienced hypoglycemia. In comparison, among the no-risk infants, 56 were euglycemic, and only 8 had hypoglycemia. The difference between the two groups was statistically significant, with a chi-square value of 11.2 and a p-value of 0.001.

The study further assessed the incidence of euglycemia and hypoglycemia among term and pre-term infants. Among term infants, 85 were euglycemic, whereas 23 experienced hypoglycemia. In comparison, among pre-term infants, 32 were euglycemic, and 20 had hypoglycemia. The difference in glucose levels between term and pre-term infants was statistically significant, with a chi-square value of 5.2 and a p-value of 0.022.

Table 2

Hour of Life	Term	Pre-term	p value
1 hour	61.5 $\pm$ 16.2	55.7 $\pm$ 16.5	0.036*
2 hours	60.5 $\pm$ 17.5	54.0 $\pm$ 17.2	0.03*
6 hours	63.3 $\pm$ 21.7	55.8 $\pm$ 22.0	0.042*
12 hours	72.0 $\pm$ 24.5	63.0 $\pm$ 24.5	0.032*
24 hours	77.2 $\pm$ 24.8	68.4 $\pm$ 24.8	0.038*
48 hours	95.0 $\pm$ 26.5	85.4 $\pm$ 26.5	0.033*

The study also examined the incidence of euglycemia and hypoglycemia based on gestational age categories: small for gestational age (SGA), appropriate for gestational age (AGA), and large for gestational age (LGA). Among SGA infants, 29 were euglycemic, while 24 experienced hypoglycemia. For AGA infants, 66 were euglycemic, and 15 had hypoglycemia. Among LGA infants, 22 were euglycemic, whereas 4 experienced hypoglycemia. The difference in glucose levels across the gestational age categories was statistically significant, with a chi-square value of 13.7 and a p-value of less than 0.001

The study examined the relationship between maternal age and the incidence of euglycemia and hypoglycemia in infants. The mean maternal age for infants with euglycemia was 27.4 $\pm$ 3.1 years, while the mean maternal age for infants with hypoglycemia was significantly lower at 25.0 $\pm$ 4.0 years. The overall mean maternal age across all groups was 26.3 $\pm$ 3.7 years. The minimum maternal age observed was 19 years, and the maximum was 32 years for both groups. The difference in maternal age between the euglycemic and hypoglycemic groups was statistically significant, with a p-value of less than 0.001.

Discussion

Within the first 48 hours of life, around 25% of high-risk newborns who were exclusively breastfed experienced at least one episode of hypoglycemia (HG). The first hour of life saw the highest incidence of HG, while the second hour saw the highest prevalence. The majority of infants with HG exhibited no symptoms. In both AGA and SGA newborns, the incidence of HG was higher in preterm than in term neonates. At three and a half months, none of the infants with asymptomatic HG displayed aberrant neurodevelopment. At discharge, exclusive breastfeeding rates were relatively high, but they progressively dropped to 50% over the course of six months.

In our study, we found that among exclusively breastfed low birth weight (LBW) infants, 55.4% exhibited euglycemia,

while 44.6% experienced hypoglycemia. In contrast, among normal birth weight infants, 92.2% were euglycemic, with only 7.8% showing hypoglycemia. This finding aligns with the study by Gill *et al.* (2023)^[1] and Jun Ma *et al.* (2024)^[2] which also reported a higher incidence of hypoglycemia in LBW infants compared to normal birth weight infants, emphasizing the importance of blood glucose monitoring in this vulnerable population.

In our study, we also evaluated the incidence of euglycemia and hypoglycemia among term and pre-term infants. Among term infants, 85 out of 108 (78.7%) were euglycemic, while 23 out of 108 (21.3%) experienced hypoglycemia. In contrast, among pre-term infants, 32 out of 52 (61.5%) were euglycemic, and 20 out of 52 (38.5%) had hypoglycemia. The difference in glucose levels between term and pre-term infants was statistically significant, indicates that hypoglycemia is more prevalent in pre-term infants compared to term infants.

Conclusion

Healthy high-risk newborns in postnatal wards can be fed just, but blood glucose levels must be regularly checked. In our study, hypoglycemia occurred in 27% of cases. The first two hours have the highest likelihood of HG development.

Compared to term newborns, preterm babies have a decreased BGL. Breastfeeding high-risk infants repeatedly and frequently can correct HG. To increase the percentage of exclusive breastfeeding, regular prenatal, postnatal, and follow-up breastfeeding counselling is necessary.

References

1. Haninger NC, Farley CL. Screening for hypoglycemia in healthy term neonates: effects on breastfeeding. *Journal of Midwifery & Women's Health*. 2001;46(5):292-301.
2. Diwakar KK, Sasidhar MV. Plasma glucose levels in term infants who are appropriate size for gestation and exclusively breastfed. *Archives of Disease in Childhood - Fetal and Neonatal Edition*. 2002;87(1):F46-48.
3. Adejuyigbe EA, Fasubaa OB, Ajose OA, Onayade AA. Plasma glucose levels in exclusively breastfed newborns in the first 48 hours of life in Ile-Ife, Nigeria. *Nutrition and Health*. 2001;15(2):121-126.
4. Eidelman AI. Hypoglycemia and the breastfed neonate. *Pediatric Clinics of North America*. 2001;48(2):377-87.
5. Bhat MA, Kumar P, Bhansali A, Majumdar S, Narang A. Hypoglycemia in small for gestational age babies. *Indian Journal of Pediatrics*. 2000;67:423-427.
6. Sasidharan CK, Gokul E, Sabitha S. Incidence and risk factors for neonatal hypoglycemia in Kerala, India. *Ceylon Medical Journal*. 2004;49(4):110-113.
7. Broadfoot M, Britten J, Tappin D, MacKenzie J. The Baby Friendly Hospital Initiative and breastfeeding rates in Scotland. *Archives of Disease in Childhood - Fetal and Neonatal Edition*. 2005;90:F114-F116.
8. Prasad B, de L Costello AM. Impact and sustainability of a baby-friendly health education intervention at a district hospital in Bihar, India. *BMJ*. 2009;310:621.
9. Narayan S, Aggarwal R, Deorari AK, Paul VK. AIIMS protocol, Division of Neonatology. *Indian Journal of Pediatrics*. 2010;77:1137-1142.
10. Lucas A, Morley R, Cole TJ. Adverse neurodevelopmental outcome of moderate neonatal hypoglycemia. *BMJ*. 1988;297(6659):1304-1308.
11. Holtrop PC. The frequency of hypoglycemia in full-term large and small for gestational age newborns. *American Journal of Perinatology*. 1993;10:150-154.
12. Harris DL, Weston PJ, Harding JE. Incidence of neonatal hypoglycemia in babies identified as at risk. *The Journal of Pediatrics*. 2012;161(5):787-791.
13. World Health Organization. Hypoglycemia of the newborn: review of literature. WHO: Geneva. 1997.
14. Hartmann AF, Jaudon JC. Hypoglycaemia. *The Journal of Pediatrics*. 1937;11:1.
15. Koh THHG, Eyre JA, Aynsley-Green A. Neonatal hypoglycemia – controversy regarding definition. *Archives of Disease in Childhood*. 1988;63:1386-1398.