



A STUDY ON HYPOGLYCEMIA IN BREASTFED LATE PRETERM NEONATES IN A TERTIARY CARE CENTRE, BHAGALPUR.

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ABSTRACT **Objective:** To evaluate the usefulness of regular monitoring of blood glucose in early diagnosis of hypoglycemia in breastfed late preterm neonate.

Methods: A total of 200 consecutively born breastfed late preterm neonates in JLNMCH, Bhagalpur, Bihar were studied and assessed for development of hypoglycemia against age of onset, symptomatology, gestational age and sex of the baby, parity and age of mother, and mode of delivery. Serial blood glucose was done at 0, 1, 3, 6, 12, 24, 48 and 72 hours of life to identify hypoglycemia.

Results: The overall incidence of hypoglycemia was 15%. Out of 30 hypoglycemic babies 24(80%) developed symptoms and only 6(20%) were asymptomatic. Most (90%) of the hypoglycemia occurred on the first day of life. Babies born to primi mothers were more prone for hypoglycemia (25%). Highest incidence was seen in babies weighing less than 2 kg (50%).

Conclusion: There is a significant incidence of hypoglycemia in late preterm babies in spite of being on breast feeds. Babies born to primiparous mothers are more prone for hypoglycemia. Therefore it is very important to regularly monitor the blood glucose levels in all late preterm babies even if they are on exclusive breast feeding.

KEYWORDS : Neonate, Breastfeeding, Late Preterm, Hypoglycemia.

INTRODUCTION:

The definition of neonatal hypoglycemia has remained elusive amongst the text books, pediatricians and experts in this field. After birth, the normal newborn infant's plasma glucose concentration falls quickly to levels below those prevalent in fetal life. This is part of the normal transition to extra uterine existence and partly triggers the endocrine and metabolic events associated with normal adaptation. Although hypoglycemia represents a low level of blood glucose that can negatively affect neurological and developmental prognosis, its numerical definition is a rather complicated and controversial issue. Hypoglycemia often does not produce clinical signs because the newborn brain does not have enough maturity [1]. Gestational age is one of the most important parameter to assess risks for morbidity and mortality in neonates. Also it is proposed that "late preterm" be defined as births between 34 0/7 weeks and 36 6/7 weeks of gestation calculated from the first day of the mother's last menstrual period.[2,3] Until recently these newborns were called "Near Term" and parents, caregivers and health professionals have treated these preterm infants on par with term infants, but they are physiologically and metabolically immature and have a higher risk of morbidity and mortality.[3,4,5]

While preterm birth rates continue to rise globally as well as in India, reasons attributed for this rise include demographic changes, infertility treatments, increases in maternal age, more multiple gestations, or increased rate of labor induction. Late preterm newborns are the fastest growing subset of preterm neonates, accounting for approximately 70% of all preterm births and about 8% of total births.[6] Infants who are late preterm may appear mature, but they are physiologically, metabolically and neurologically immature. These infants are at higher risk for a number of problems including poor feeding, hypoglycemia, hypocalcemia, jaundice, infections, respiratory distress, failure to thrive and hospital re-admission.[3,4] These infants present a number of feeding challenges including fewer and shorter awake periods and excessive sleepiness. They tire easily during feeding; they have a weak suck and poor muscle tone, and may exhibit an inability to sustain sucking, and fatiguing easily before finishing a feed. Their tone may be adequate at the start of a feeding session but rapidly decreases during the feeding, indicating decreased endurance.[7] There is a significant incidence of hypoglycemia in preterm and low birth weight babies in spite of being on breast feeds.[8]

Glucose concentration is the most frequently measured laboratory

value in neonatal medicine, presumably to diagnose and treat low glucose concentrations, or "hypoglycemia". Consequently regular assessment of blood glucose has become an integral part of basic neonatal care in most centers. Therapeutic interventions, with fairly elaborate protocols for "low blood sugar", are meticulously adhered to in neonatal units. Unfortunately, there is still no research basis or consensus regarding the definition of neonatal hypoglycemia, or who is at risk and under what circumstances, or when screening should be performed.[9,10] But severe glucose deficiency can potentially lead to cerebral energy failure and impaired cardiac performance.[11,12,13] Thus, maintenance of glucose delivery to all organs is an essential physiological function. Normal term infants have sufficient alternate energy stores and capacity for glucose production from glycogenolysis and gluconeogenesis to ensure normal glucose metabolism during the transition to extrauterine life and early neonatal period. But this does not hold good for late preterm babies. The operational threshold for hypoglycemia is defined as "that concentration of plasma or whole blood glucose at which clinicians should consider intervention, based on the evidence currently available in literature".[9] This threshold is currently believed to be a blood glucose value of less than 40 mg/dl in both term and preterm babies. We therefore evaluated 200 late preterm breast fed neonates, and monitored their plasma glucose at 0, 1, 3, 6, 12, 24, 48 and 72 hours of life along with the symptoms at the onset of hypoglycemia with the aim of clarifying some of these issues.

MATERIALS AND METHODS:

It is a longitudinal study of pattern of blood glucose in late preterm infants conducted at Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar. "Late preterm" is defined as infants born at gestational age between 34 0/7 weeks and 36 6/7 weeks calculated from the first day of mothers last menstrual period. Hypoglycemia was defined as Gucometer blood sugar reading of less than 40mg/dl. 100 Late Preterm neonates born from April 2017 to March 2018 delivered by normal vaginal delivery or by cesarean section and who were on exclusive breast feed from birth form the subjects of our study. These neonates were taken up for collecting blood samples at 0,1,3,6,12,24,48 and 72 hours. Samples were collected by heel prick (capillary blood). The glucose level was measured using Accu-check active glucometer. Those who found hypoglycemic by glucometer method were confirmed by Glucose oxidase method. Neonates detected to have hypoglycemia during this study were transferred to Neonatal Intensive Care Unit (NICU) and managed according to the standard protocol.

Babies who were small for gestational age (SGA), large for gestational age (LGA), those admitted to NICU, multiple gestation babies, those started on formula feeds, those who have not given the consent and those who were discharged before 72 hours of birth were excluded from the study. The relationship of hypoglycemia against age of onset, symptomatology, gestational age, birth weight and sex of the baby, parity and age of mother, and mode of delivery were analysed. The clinical and laboratory parameters of the study population were expressed in terms of mean and \pm standard deviation (SD). Nonparametric categorical data were compared with Chi-square test and parametric continuous data were compared with Student's t test. P values less than 0.05 were considered statistically significant.

RESULTS:

A total of 200 late preterm babies were assessed which included 102 boys and 98 girls. The overall incidence of hypoglycemia was 15%. Out of 30 hypoglycemic babies 24 (80%) developed symptoms, and 6 (20%) were asymptomatic. Hypoglycemia was slightly more in boys but the difference was not statistically significant [Table 1].

Majority of the hypoglycemia occurred on the first day (80%), and remaining 20% babies were hypoglycemic on 2nd day. No babies developed hypoglycemia on third day [Table 2]. Considering the intervals in hours, there was no hypoglycemia developed at birth and after 48 hours. At 1 hour 6 babies, at 3 hours 8 babies, at 6 hours 6 babies, at 12 hours 4 babies, at 24 hours 4, and at 48 hours 2 baby developed hypoglycemia. Considering the mode of delivery, out of 160 babies born by normal vaginal route, 22 (14%) had hypoglycemia and in caesarian born babies, 8 (20%), developed hypoglycemia. [Table 3]. But this difference is statistically not significant. Out of 120 babies born to multiparous mothers, 10 (8.3%) babies developed hypoglycemia and out of 80 babies born to primiparus mothers 20 (20%) developed hypoglycemia. [Table 4] and this is statistically significant. In the gestational age group the highest incidence was seen in 34 week age group. There were 6(37%) hypoglycemic babies in this group. In the age group 35 weeks, 14 (17%) babies and in 36 week age group 10 (10%) were hypoglycemic. The incidence in babies weighing less than 2 kg was very high. There was 6 (50%) hypoglycemic babies out of 12 babies in this weight category, compared to 24 (12.7%) out of 188 babies weighing more than 2 kg. [Table 5 and 6]

Majority of the hypoglycemic babies were symptomatic in our study. Out of 30 babies with hypoglycemia 24(80%) babies were symptomatic and out of symptomatic babies, 66% showed poor feeding, 58% were lethargic, 41% had jitteriness, and 25% had weak cry. Apnea and seizures were found in none of the babies in our study.

Table 1: Incidence of Hypoglycemia

	Asymptomatic Hypoglycemia	Symptomatic Hypoglycemia	Total Hypoglycemic Babies	
Male	102	4 (4%)	12 (11.7%)	P>0.05
Female	98	2 (2%)	12 (12.2%)	
Total	200	6 (3%)	24 (12%)	

Table 2: Age of onset of Hypoglycemia

Time	Hypoglycemia	
<24 Hours	24 (80%)	P<0.01
24-48 Hours	6 (20%)	
>48 Hours	0	
Total	30 (100%)	

Table 3: Incidence in relation to mode of delivery

Type of Delivery	No. of Cases	Incidence of Hypoglycemia	
Normal Vaginal Delivery	160 (80%)	22 (14.5%)	p=0.79
Cesarean Section	40 (20%)	8 (16.5%)	
Total	200 (100%)	30 (15%)	

Table 4: Incidence of Hypoglycemia in relation to Parity

Factor	No. of Cases	Incidence of Hypoglycemia	
Multiparous	120 (60%)	10 (8.3%)	P<0.05
Primiparous	80 (40%)	20 (25%)	
Total	200 (100%)	30 (15%)	

Table 5: Incidence of Hypoglycemia in relation to Gestational Age

Gestational Age (weeks)	Total Cases	Cases with Hypoglycemia	
		(n=15)	%
34	16	6	37.5%
35	80	14	17.5%
36	104	10	9.6%

Table 6: Incidence in relation to Birth Weight

Birth Weight	No. of Cases (n=200)	Hypoglycemic Babies (n=30)	
<2kg	12	6 (50%)	P<0.01
>2kg	188	24 (12.7%)	

Table 7: Incidence of Hypoglycemia in relation to maternal age

Maternal Age Group	No. of Cases (n=200)	Incidence
		(n=30)
18-25	106 (53%)	14 (13.2%)
25-35	76 (38%)	12 (15.8%)
>35	18 (9%)	4 (22.2%)

Table 8: Symptomatology of Hypoglycemia

	Symptoms	
Symptomatic	Poor Feeding	16 (66%)
	Lethargy	14 (58%)
	Jitteriness	10(41%)
N=24 (80%)	Weak Cry	6 (25%)
	Sweating	2 (8%)
	Seizure	0 (0%)
	Apnea	0 (0%)
Asmptomatic	6 (20%)	

DISCUSSION:

In our study the incidence of hypoglycemia in late preterm newborns was 15%. The incidence of hypoglycemia shown by previous studies in preterm infants were 67% by Lubchenco and Bard,[14] 4.3% by Chance & Brower,[14] 15% by Fluge,[16] 3-15% by Hawdon,[17] 12.8% by Singhal et al.[18] Harris and Weston found 51% incident of hypoglycemia on study of high risk neonates.[19] Information on the incidence of neonatal hypoglycemia in developing countries is very limited. In 1993 Anderson et al conducted a cross sectional study of 226 full term, uncomplicated newborns in Kathmandu Low birth weight and hypothermia were associated with hypoglycemia, which was present in 55% of those weighing < 2200 gms.[20]

The wide variations in the incidence of hypoglycemia seen in the above studies can be attributed to variations in definitions of hypoglycemia, the frequency of blood glucose monitoring, birth weight and gestational age of the neonates as well as the feeding regimes advocated, which have evolved over the years. The incidence of hypoglycemia was highest (66%) on the first day of life. According to Hawdon et al in a study on preterm infants the mean blood glucose concentration was significantly lower on the first day than on subsequent days.[17] Likewise, in a study by MA.Bhat et al on SGA babies, almost all the episodes of hypoglycemia occurred within 24 hours.[21]

In our study hypoglycemia was seen only on day 1 or day 2 with no episodes afterwards, suggesting the need for constant monitoring of blood glucose values in the first 48 hours.

The incidence of hypoglycemia was more in primiparous mothers compared to multiparous. This observation was correlating with other studies and this may be probably because primiparous mothers are the ones who face more difficulties related to breast feeding.[18] Hence babies born to this group of mothers should be monitored more closely for hypoglycemia.

There is no significant variation in the incidence of hypoglycemia as far as the mode of delivery is concerned. It was 14.5% in normal vaginal delivery and 16.5% in caesarean born babies. It is comparable with the study done by K K Divakar on neonates, where he found that the mode of delivery does not affect the blood glucose of the baby.[22]

These results are also similar to a study by Hawdon et al,[17] where they did not find significant difference in the incidence of hypoglycemia between infants born by normal vaginal delivery and caesarean section in the first week of life. The incidence was almost similar when the newborn sex was considered as a variable with figures of 15.6% in males and 14.2% in females, which contrasts with the study by K.Inayatullah where he found, hypoglycemia was more common in male babies.[23] But study done by Duvanel et al on SGA infants showed no significant difference between these groups.[12] Whereas in a study by Bhalla et al, mean blood glucose values were higher in female preterms compared to males and Pildes have mentioned that hypoglycemic infants are predominantly males.[24,25]

In our study, the common symptoms in hypoglycemic babies were poor feeding, jitteriness, sweating, lethargy and weak cry. Out of which poor feeding, lethargy and jitteriness were the most common symptoms. 20% of the babies did not show any symptoms. This is comparable with the study done by K.Inatathullah where he found that poor feeding and jitteriness were the most common symptoms in hypoglycemic babies.[23] The incidence of hypoglycemia was highest (66%) in the 34 weeks gestational age babies category and reduced to 41.7% in the 35 weeks category and 11.7% in the 36 weeks. These results are comparable to a study by Bhalla M et al where they found that the mean glucose values were directly related to the gestational age.[24] In a study by Singhal et al the incidence of hypoglycemia was 12.8% in preterm compared to 3.6% in term babies.[18] It can be thus concluded that lower the gestational age, the greater will be the risk of hypoglycemia in babies who are appropriate for gestational age. Nancy Wight have found out that the clinical manifestations of hypoglycemia are nonspecific,[26] occurring with a variety of other neonatal problems. In a workshop report on the proposal of neonatal hypoglycemia in 2009, it was stated that grade, duration and frequency of the hypoglycemia should be determined in order to determine the long-term effects of asymptomatic hypoglycemia[27].

The physician must assess the general status of the infant by observation and physical examination in the presence of an arbitrary low glucose level, to rule out other disease entities and processes that may need additional laboratory evaluation and treatment so that the misdiagnosis can be prevented.

CONCLUSION:

In our study it was concluded that significant percentage of late preterm babies who are on breast feed developed hypoglycaemia. Therefore it is very important to monitor regularly the blood glucose levels of late preterm babies who are on breast milk during the first 48 hours of life so that the deadly complications of hypoglycemia in late preterm babies can be prevented.

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