

Original Research Article

Glycemic status in exclusively breast fed low birth weight babies In first 72 hours of life in a tertiary care hospital

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ABSTRACT

Background: Neonatal hypoglycaemia, a common metabolic problem, often goes unnoticed owing to lack of specific symptoms. It can lead to considerable mortality and morbidity with long term neurological sequelae. Adequate breast feeding play an important role in maintaining normal glucose levels. So, this study is done to assess the incidence of hypoglycaemia in exclusively breast fed low birth weight babies, both term and preterm neonates and evaluate the impact of early breast feeding on glycaemic status upto 72 hours of life.

Methods: This study was conducted over 12 month period involving 236 AGA (Appropriate for gestational age), SGA (Small for gestational age) babies with birth weight between 1.6-2.49 kg. Blood glucose values were measured at birth, 3h, 6h, 12h, 24h, 48h and 72h of life after delivery which was independent of feeding time. Hypoglycaemia was assessed against age of onset, gestational age, sex of baby, mode of delivery and time of initiation of breast feeding.

Results: Total 56 episodes of hypoglycaemia were recorded in 52 babies of which 46 (27%) were term SGA babies and 6(8%) were preterm AGA babies ($p=0.00148$). The incidence of hypoglycaemia was found to be 22%, highest during the first 24 hours of life (93%) and delayed breast feeding is the most commonly noted risk factor ($p=0.00024$).

Conclusions: Low birth babies are more prone to develop hypoglycaemia especially in first 24 hours of life with delayed introduction of breast feeding being one of the common risk factors and asymptomatic hypoglycaemia can be managed with frequent breast feeding without any formula feeds.

Keywords: AGA, Breast feeding, Hypoglycaemia, Low birth weight, SGA

INTRODUCTION

Neonatal hypoglycaemia, a common metabolic problem, which is due to inability to maintain a normal glucose homeostasis.¹ During foetal life, there is a continuous glucose supply from mother through placenta. After birth, there is an abrupt cessation of maternal glucose during which period the new-born has to maintain normal glucose levels (during periods of fasting and in between feeds).² Hypoglycaemia may occur during this transitional period, from intrauterine glucose regulation to extra

uterine adaptation but many a proportion of them do not manifest symptoms.³ The developmental immaturity of adaptive mechanisms like gluconeogenesis, glycogenesis and ketogenesis may further aggravate hypoglycaemia.⁴ Undiagnosed hypoglycaemia can have long term neurological consequences; thus prevention, early detection and treatment of asymptomatic hypoglycaemia is emphasized.⁵ Adequate breast feeding play an important role in maintaining normal glucose levels. But this may be inadequate due to various reasons like post-operative pain and sedation, primiparity, unfamiliarity

with proper feeding practices, may interfere with successful establishment of breast feeding even in healthy babies without any risk factors.⁶

Hence, authors conducted this study to see the incidence of hypoglycaemia in both term and preterm low birth babies who are exclusively breast fed in first 72 hours of life.

METHODS

This is a longitudinal prospective study conducted over 12 months period from February 2017 to January 2018 in Siddhartha Medical College, Vijayawada, a tertiary care centre. 311 neonates were enrolled in the study of which 32 did not give consent and in 43 new-borns all 7 readings could not be done (lost to follow up). Remaining 236 included both term and preterm low birth weight babies (1.6 kg-2.49 kg).

The terms “SGA” and “AGA” were defined according to intrauterine growth curves (fenton’s growth charts) based on percentile of birth weight. Based on BFHI (Baby Friendly Hospital Initiative), 24 hours rooming in and KMC (kangaroo mother care) is practised to encourage breast feeding. Breast feeding is started as soon as possible and time of initiation of feeding is noted. Feeding within one hour of delivery is considered as early feeding and after one hour as delayed feeding.

Inclusion criteria

All neonates between 1.6 kg -2.49 kg who are on exclusively breast fed from birth.

Exclusion criteria

Neonatal asphyxia, Infant of diabetic mother, sepsis, babies who are on i.v. fluids for any other cause, factors not allowing for breast feeding (cleft palate), post term IUGR, prelacteal feeds given, who did not give consent, in whom all readings could not be taken.

Method of collection of data

The definition of hypoglycaemia remained controversial but in the present study we considered blood glucose values of <40 mg/dl. After proper aseptic measures capillary blood was collected by heel prick method for screening by reagent strip method and using glucometer.

The glucose levels were assessed within 30 min of birth, 3h, 6h, 12h, 24h, 48h, 72h independent of feeding time. Hypoglycaemia is assessed against age of onset, birth weight, sex of baby, mode of delivery and time of initiation of breast feeding. New-borns with asymptomatic hypoglycaemia were breast fed immediately and repeat glucose levels were done after half an hour of feed completion.

Statistical analysis

Data is analysed using Statistical Package for Social Sciences (SPSS, version 20). Descriptive statistics have been used for this study. Mean and standard deviation are used to calculate demographic variables in the study. Chi square tests (χ^2) were performed to evaluate the association of the independent variables with hypoglycaemia. A p value <0.05 was considered statistically significant.

RESULTS

Total numbers of cases enrolled in the study were 236 neonates constituting 45.8% (n=108) males and 54.2% (n= 128) females. Out of 236 neonates 72.4% (n=171) were term SGA and 27.5% (n=65) were Pre-term AGA babies. 56 episodes of hypoglycaemia were recorded in 52 babies. Applying the cut-off of blood glucose levels of 40 mg/dl, the incidence of hypoglycaemia was 22%. The incidence in term SGA babies is 26.9% (n=46) and 10% (n=6) in pre-term AGA babies (Table 1). In this study, a slightly higher incidence of hypoglycaemia is found in males of 23.1% (n=25) when compared to females of 21.1% (n=27) (p=ns).

Table 1: Incidence of hypoglycaemia in relation to term/preterm neonates.

T/PT	No. of patients	Hypoglycemia/ Euglycemia	
		Euglycemia	Hypoglycemia
PT (AGA)	65 (27.5%)	59 (90%)	6 (10%)
T (SGA)	171 (72.5%)	125 (73%)	46 (26.9%)
Total	236	184 (77.9%)	52 (22%)

Chi square=5.87, p <0.01

Table 2: Incidence of hypoglycaemia in relation to initiation of breast feeding.

EBF/DBF	No. of patients	Hypoglycemia/ Euglycemia	
		Euglycemia	Hypoglycemia
DBF	143	96 (67.1%)	47 (32.9%)
EBF	93	88 (94.6%)	5 (5.4%)
Total	236	184 (78%)	52 (22%)

Chi square=19.1, p<0.01

In the study, according to the time of initiation of breast feeding babies were categorized into early breast feeding (EBF) group and delayed breast feeding (DBF) group which constituted 39.4% (n=93) and 60.5% (n=143) neonates respectively. The incidence of hypoglycaemia is significantly found to be higher in the DBF group 32.9% (n=47) in contrast to EBF group 5.4% (n=5) (Table 2) [p value <0.01].

The incidence of hypoglycaemia was 46.4% (n=13) in 1.6-1.79 kg group, 37.5% (n=6) in 1.8-1.99 kg group,

32.3% (n=21) in 2-2.19kg group and 9.4% (n=12) in 2.2-2.49 kg group, thereby showing an inverse relation between birth weight and incidence of hypoglycaemia. The incidence of hypoglycaemia was correlated with

maternal age and hypoglycaemia is predominant in 21-25 years age group, 23% (n=33). Followed by 21% (n=13) in <20 yrs and 19.3% (n=6) in >25 years age group.

Table 3: Mean glucose values at predetermined intervals.

Hours of life	Min-Max	Mean \pm SD	Difference	t value	P value
1 (at birth)	33.00-68.00	49.96 \pm 6.00	-	-	-
2 (3h)	28.00-92.00	56.12 \pm 12.00	-6.165	-8.252	<0.001**
3 (6h)	20.00-96.00	62.47 \pm 13.13	-12.517	-13.432	<0.001**
4 (12h)	28.00-108.00	70.92 \pm 14.25	-20.958	-22.484	<0.001**
5 (24h)	32.00-116.00	76.80 \pm 14.82	-26.843	-27.024	<0.001**
6 (48h)	45.00-130.00	82.94 \pm 15.82	-32.983	-31.611	<0.001**
7 (72h)	52.00-198.00	91.31 \pm 19.85	-41.352	-32.071	<0.001**

According to mode of delivery incidence of hypoglycaemia is significantly higher in LSCS group 26.5% (n=27) in contrast to 18.1% (n=25) in NVD group (Table 4).

Table 4: Incidence of hypoglycemia in relation to mode of delivery conducted.

MOD	No. of patients	Euglycemia/Hypoglycemia	
		Euglycemia	Hypoglycemia
LSCS	102	75 (73.5%)	27 (26.5%)
NVD	134	109 (81.3%)	25 (18.7%)
Total	236	184 (78%)	52 (22%)

Chi square=1.3, p=0.25 (not significant)

The mean glucose values are found to be increasing as hours of life advances irrespective of gestational age and birth weight (Table 3). Maximum incidence of hypoglycaemia is noted in first 24 hours of life (Figure 1).

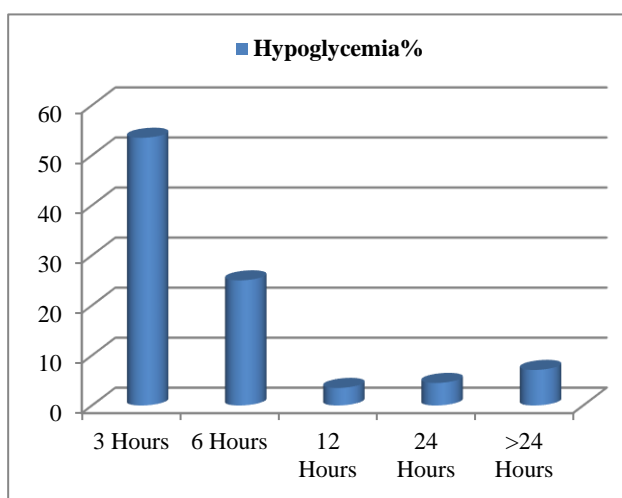


Figure 1: Incidence of hypoglycemia according to hours of life.

DISCUSSION

Many studies have shown that early initiation of exclusive breast feeding meets the nutritional and metabolic needs of healthy, term neonates. Establishment of normal breast feeding may be interfered by introduction of prelacteal feeds like honey, glucose water and others. However, according to NFHS-4 (National Family Health survey) India has increased in the incidence of exclusively breast feeding practices and establishment of breast feeding within one hour birth to 42.8 and 51% respectively.⁷ In this study the incidence of hypoglycaemia in LBW both term and preterm neonates is 22%.

Table 5: Incidence of hypoglycemia compared with other studies.

Study	Blood glucose reference level	Incidence of hypoglycaemia
Present study	<40mg/dl	22%
De AK et al ⁹	<40 mg/dl (2.2 mmol/L)	14.5%
Lubchenco et al ⁸	<30 mg/dl (1.7 mmol/L)	10%
Osler et al ¹²	<40mg/dl (2.2 mmol/L)	23%
Bhat et al ¹¹	< 40mg/dl (2.2 mmol/L)	25.2%

Hawdon et al, quoted the incidence of hypoglycaemia in the term babies ranging between 0 and 8% and between 3 and 15% in the preterm babies.¹² In the present study the incidence in term SGA babies is 25.1% and 10% in pre-term AGA babies, thereby showing a significant higher incidence in term IUGR babies. This difference in the incidence could be explained as only preterm AGA babies are present in this study. The incidence of hypoglycaemia was significantly found to be higher in the DBF group (32.9%) in contrast to EBF group (5.4%)

[P value <0.01] in the present study, while Kumar A et al, found that 56% of new-borns developed hypoglycaemia in delayed feeding group, only 21% in early feeding group had hypoglycaemia.⁹ The incidence of hypoglycaemia in the present study was highest on the first day of life (93%) showing maximum during first 3 hours of life (53.5%). Study by Kumar A et al, found that overall incidence of hypoglycaemia in healthy breastfed new-borns was 32% and the blood glucose values increased as their hours of life increased, showing similar pattern to the present study.⁹

There is no statistical significance in the incidence of hypoglycaemia when correlated with mode of delivery and gender. It is 26.5% in babies born through cesarean section, 18.7% in babies born through vaginal delivery and 23.1% in males when compared to females of 21.1% (p=ns). Study by Divakar KK et al, also found that the mode of delivery does not affect the blood glucose of the baby.¹³

In the study by Duvanel et al, no significant difference was noticed in the incidence of hypoglycaemia when correlated with maternal age, which is similar with the present study.¹⁴ In this study there is a slight high incidence of hypoglycaemia in the 21-25 years maternal age group (37.1%).

In this study babies with maternal risk factors is correlated with incidence of hypoglycaemia, found that oligohydramnios was higher than other risk factors considered, which similar to a study by Sasidharan et al.¹⁵ However, the presence of these maternal risk factors did not significantly affect glucose levels.

The incidence of hypoglycaemia was 46.4% in 1.6-1.79 kg group, 37.5% in 1.8-1.99 kg group, 32.3% in 2-2.19 kg group and 9.4% in 2.2-2.49 kg group, thereby showing an inverse relation between birth weight and incidence of hypoglycaemia. This is similar to a study by Amarendra et al, where mean glucose values were inversely related to the birth weight.¹⁶ It can be thus concluded that lower the birth weight, the greater will be the risk of hypoglycaemia.

CONCLUSION

This study emphasises that infants should be breastfed immediately and frequently to prevent hypoglycaemia especially LBW infants (both preterm and small-for-date) who are at greater risk in first 24 h of life. Hence new-borns in post-natal wards irrespective of mode of delivery can be exclusively breast fed but there is a need to carefully monitor their blood glucose levels at least in first 24 hours of life for at risk babies. Asymptomatic hypoglycaemia can be managed with frequent breast feeding, however long term studies are required to evaluate the future neurological damage in these asymptomatic babies with hypoglycaemia. India has stepped forward in the statistics of exclusive breast

feeding and early breast feeding but still a way far behind WHO recommendations. Hence more emphasis is required on early initiation of breast feeding and to bridge this gap effective counsellors are essential from antenatal period. Training modules for health care workers for supporting early breast feeding practices are to be promoted.

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