Original Research Article

Incidence of hypoglycemia in newborn babies born with perinatal and postnatal risk factors

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Abstract

Background: Hypoglycemia is a common, preventable and neglected problem in many maternity hospitals in developing countries. In the presence of certain high risk factors like small for date, large for date, prematurity etc., the probability of hypoglycemia increases many fold. **Aim:** To detect the incidence of hypoglycemia in newborn babies born with perinatal and postnatal risk factors. **Material and Methods:** A total of 170 LBW and high risk babies were studied for incidence of hypoglycemia.BSL was done at regular intervals 0, 3, 6, 12, 24, 48, 72 hours.All these babies were observed for the symptoms associated with hypoglycemia. Their correlation with low blood sugar level was established. **Results:** Out of 170 neonates, 32 had hypoglycemia, thus the incidence of hypoglycemia was 18.82%.Incidence of hypoglycemia in preterm babies was 22.4% (28 out of 125) and in term babies the incidence was 8.8% (4 out of 45).Out of 32 hypoglycemia babies, 8 were SGA and 24 were AGA babies. 7 (21.88%) babies had birth asphyxia and highest i.e. 4 babies are preterm AGA among them. 6 (18.75%) babies had hyperbilirubinemia and 4 among them are preterm AGA babies. **Conclusion:**Among all perinatal and postnatal risk factors, incidence of hypoglycemia is more common in septicemia and birth asphyxia. Mandatory blood glucose screening of all neonates with at least one of these risk factors serves as an easy and cost effective measure of detection and treatment of this morbidity.

Key Words: Newborn babies, hypoglycaemia, risk factors, septicaemia.

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INTRODUCTION

Hypoglycemia is one of the most common metabolic problems encountered in the newborns. It is known to be associated with brain dysfunction and neuromotor developmental retardation.The overall incidence of hypoglycemia in neonates varies from 0.2–11.4%. However, in the presence of certain high risk factors i.e. small for date, large for date, prematurity etc., the probability of hypoglycemia increases many fold.[1] Preterm and SGA infants are more prone for hypoglycemia due to larger brain size as compared to body mass and poor hepatic stores of glycogen and fat. They are at risk of the adverse effects of hypoglycemia by virtue of impaired gluconeogenesis and ketogenesis both immediately after birth and in response to persistent hypoglycemia. SGA infants are at risk of adverse neurological sequelae of neonatal hypoglycemia for a number of reasons like chronic hypoglycemia, acidosis and hypoxia may have occurred in utero and also perinatal asphyxia is more common.[2] Thus, hypoglycemia in the newborn infants represent an urgent diagnostic and therapeutic challenge that must be answered promptly to avoid the adverse consequences of hypoglycemia, most important damage to CNS.[3] The present study was undertaken to detect the incidence of hypoglycemia in newborn babies born with perinatal and postnatal risk factors.

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MATERIAL AND METHODS

This hospital based cross sectional study was conducted over a period of one year after getting approval from Institutional ethical committee. A total of 170 LBW and high risk babies were studied for incidence of hypoglycemia.

Inclusion Criteria

a. LBW and VLBW babies delivered in this hospital and included:
   i. Babies with perinatal risk factors.
   ii. Babies with postnatal risk factors.
b. LBW and VLBW babies required NICU admission.

Exclusion Criteria

a. Babies delivered outside this hospital (outborn).
b. Babies with weight < 1000 gm.
c. Babies received steroids or adrenergic drugs any time in 1st 72 hours.
d. Babies required GIR > 8 mg/Kg/ min.
e. Babies of diabetic mother.

Definitions

- Hypoglycemia**:** 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.[4,5]
- Preterm **:** Babies born with gestational age less than 37 weeks.[6]
- Low Birth Weight **:** Babies weighing between 1.5 to 2.5 kg.[7]
- Very Low Birth Weight **:** Babies weighing between 1 to 1.5 kg.[7]
- SGA and AGA **:** SGA is defined as birth weight < 10 percentile and AGA is defined as birth weight between 10 to 90 percentile.[6]

Methodology

All the infants in the study were LBW and high risk babies, so, BSL was done at regular intervals 0, 3, 6, 12, 24, 48, 72 hours. Whole blood samples were obtained from the heel using dextrostix, meanwhile the glucometer was started. If glucometer showed blood sugar level in the range of hypo/ hyperglycemia this reading was rechecked by glucose oxidase perioxide method from laboratory.If required treatment was given in the form of increased GIR and IV boluses or regular feedings. All these babies were observed for the symptoms associated with hypoglycemia. Their correlation with low blood sugar level was established. Babies who required steroids or adrenergic drugs for treatment were excluded as those agents to alter the sugar levels. Depending upon the birth history, clinical examination, laboratory investigation, perinatal and postnatal risk factors decided. As sugar monitoring was continued upto 72 hours, diagnosis was established at the end of the 72 hours. Their correlation with hypoglycemia studied.Maternal RBS was also measured before or at the time of delivery to rule out hyperglycemic state in mother. It helped in ruling out hyper insulinic state in neonate.So, the study was done to find approximate incidence of hypoglycemia in high risk newborns.

RESULTS

Out of 170 neonates, 32 (18.82%) had hypoglycemia, while 138 (81.18%) neonates did not had hypoglycemia. Of the 102 male cases, 20 (19.6%) cases had hypoglycemia and out of 68 female cases, 12 (17.6%) cases had hypoglycemia.There were more males than compared to females. The difference was statistically not significant (p=0.8424). Out of 170 neonates, 135 were AGA babies and amongst them, 107 were preterm AGA out of which 23 (21.50%) babies had hypoglycemia, 28 were term AGA of which only 1 (3.57%) baby had hypoglycemia. Out of 170 neonates, 35 were SGA babies and amongst them, 18 were preterm SGA out of which 5 (27.78%) babies had hypoglycemia, 17 were term SGA of which 3 (17.65%) babies had hypoglycemia.

Table 1: Blood sugar levels related to gestational age and maturity(n=170)

Gestational Age	Maturity	Blood Sugar Levels		Total
		Hypoglycemia	Normal	
AGA (n=135)	Preterm	23 (21.50%)	84 (78.50%)	107 (100%)
	Term	01 (03.57%)	27 (96.43%)	028 (100%)
SGA (n=35)	Preterm	05 (27.78%)	13 (72.22%)	018 (100%)
	Term	03 (17.65%)	14 (82.35%)	017 (100%)
Total		**32 (18.82%)**	**138 (81.18%)**	**170 (100%)**

Out of 170 neonates, 45 (26.47%) were very low birth weight babies and out of them 13 (7.65%) babies had hypoglycemia. Out of 170 babies, 125 were low birth weight babies, of which 19 (11.17%) babies had hypoglycemia, 16 babies of them were weighing between 1.5–2 kgs (9.41%) and 3 babies were weighing between 2–2.5 kgs (1.76%). Thedifference was statistically not significant (P=0.3451).

Table 2: Blood Sugar Level related to Birth Weight

Birth Weight	Weight in Kgs	Blood Sugar Levels		Total
		Hypoglycemia	Normal	
VLBW	1–1.5	13 (07.65%)	32 (18.82%)	45 (26.47%)
LBW	1.5–2	16 (09.41%)	67 (39.41%)	83 (48.82%)
	2–2.5	03 (01.76%)	39 (22.94%)	42 (24.71%)
Total		**32 (18.82%)**	**138 (81.18%)**	**170 (100%)**

N (Total Sample)	Test	Df	Test Statistics	P value	Significance
170	Chi–square	6	6.745	0.3451	Not Significant

Table 3: Hypoglycemia related to Gestational Age, Maturity and Diagnosis (n=32)

Gestational Age	Maturity	BA	HBN	IUGR	MAS	RDS	Sepsis	PT	Total
SGA	Preterm	1	2	1	0	0	1	0	5
	Term	1	0	1	0	0	1	0	3
AGA	Preterm	4	4	0	0	3	6	6	23
	Term	1	0	0	0	0	0	0	1
Total	**7**	**6**	**2**	**0**	**3**	**8**	**6**	**32**	

(BA=Birth Asphyxia; HBN=Hyperbilirubinemia; IUGR=Intrauterine Growth Retardation; MAS=Meconium Aspiration Syndrome; RDS=Respiratory Distress Syndrome; PT=Preterm).

The above table shows that out of 32 hypoglycemia babies, 8 were SGA and 24 were AGA babies. 7 (21.88%) babies had birth asphyxia and highest i.e. 4 babies are preterm AGA among them. 6 (18.75%) babies had hyperbilirubinemia and 4 among them are preterm AGA babies. 2 (6.25%) babies were IUGR, 3 (9.38%) babies had RDS and all of them are preterm AGA. 8 (25%) had septicemia and maximum 6 were preterm AGA. 6 (18.75%) babies were only preterm who had hypoglycemia.

DISCUSSION

In our study out of 170 neonates, 32 had hypoglycemia, thus the incidence of hypoglycemia was 18.82%. Out of these 32 hypoglycemic neonates, males were 20 (62.5%) and females were 12 (37.5%). Though, hypoglycemic males are more than hypoglycemic females. The difference was not statistically significant. Incidence of hypoglycemia studied by Sexon WR*et al* was 28.6% in high risk infants and 20.6% in overall group which is comparable to our study.[8]Singhal PK *et al*have found incidence as 4.8% of total live births but the actual incidence among the high risk group was 20.6% in their study.[1]Explanation for high incidence in low birth weight and premature infants was explained because of deficient hepatic gluconeogenesis from lipids and amino acids, lack of substrate delivery particularly of lipids to the liver or a combination of the two.[9] It is also due to immature hormone and enzyme response. In our study, incidence of hypoglycemia in preterm SGA group was highest followed by preterm AGA then term SGA. Minimal incidence was in term AGA babies. The only hypoglycemic baby had addition stress factor of asphyxia. Ward Platt MP and Hawdon JM in a longitudinal study of 33 SGA infants throughout the first postnatal week, found that increase blood levels of lactate and other total gluconeogenic substrates persisted until the fourth post–natal day in preterm SGA infants but fell within the first 24 hours in term SGA infants thereafter being lower than those of AGA infants.[10] This seems consistent with the hypothesis that elevated concentrations of gluconeogenic substrate reflect delayed maturation of gluconeogenic pathways in SGA infants particularly those born preterm. It was observed in our study that maximum incidence of hypoglycemia occurred in babies weighing between 1–1.5 kgs followed by babies weighing between 1.5–2 kgs. Very minimal incidence was seen in babies weighing between 2–2.5 kgs.So, as the weight increases, incidence of hypoglycemia decreases. This can be explained because of increase substrate stores for glucose formation. We observed that maximum hypoglycemic babies were having septicemia (8/32) i.e. 25%, 4 of them were preterm AGA babies. It was followed by birth asphyxia (7/32) i.e. 21.88% and 6 of them were preterm AGA babies. Hyperbilirubinemia babies were (6/32) i.e. 18.75% and 4 of them were preterm AGA babies. Out of 32 babies, 6 were preterm AGA without any risk factor, except prematurity and birth weight. But still they comprised 18.75% of total hypoglycemic babies. Out of 32 babies, 3 (9.38%) had RDS all were preterm AGA. IUGR were 2 (6.25%). In our study, none of MAS baby developed hypoglycemia. Finding of our study are similar to the Singhal PK *et al* study in which amongst hypoglycemic babies, maximum were of septicemia and asphyxia group.[1]William AFhas also stated that neonates at risk of hypoglycemia includes those preterm and/or SGA, those who suffered from asphyxia or who are sick.[11] In conclusion, significant incidence of hypoglycemia is seen in LBW and VLBW babies and more common in SGA babies than AGA babies. Preterm babies are more prone to hypoglycemia than term babies.Among all perinatal and postnatal stress factors, incidence of hypoglycemia is more common in septicemia and birth asphyxia which can be seen from first day to third day of life. Mandatory blood glucose screening of all neonates with at least one of the prominent risk factors serves as an easy and cost effective measure of detection and treatment of this morbidity.

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