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Study of Low Birth Weight Newborns with Special Reference to Blood Glucose Level and Clinical Manifestations in RIMS Hospital.

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Abstract
Background: *Neonatal hypoglycemia is one of the most frequently encountered metabolic abnormalities in newborn infants. Estimates of the incidence of hypoglycemia in the newborn depend both on the definition of the condition and the methods by which blood glucose concentrations are measured.The definition of hypoglycemia in the newborn infant has remained controversial because of a lack of significant correlation among plasma glucose concentration, clinical symptoms and long-termsequelae. Low birth weight newborns are at a higher risk for hypoglycemia as compared to normal birth weight.*
Objective:*To determine the incidence of hypoglycemia in low birth weight (LBW) newborns and to assess the clinical manifestations and short term outcomes of hypoglycemia in LBW newborns.*
Materials and methods: *This cross-sectional study was conducted from September 2017 to August 2019 on 200 LBW babies with birth weight <2500 gram up to 1000 gram admitted within 2 hours of life in Pediatric ward, RIMS, Imphal, Manipur. Detailed examination was done. Blood glucose level was checked at 2, 6, 12, 24, 48 and 72 hours of life.*
Results: *The incidence of hypoglycemia in low birth weight newborns was 19%**.** Out of 200 newborns, 38 (19%) developed hypoglycemia. Out of 38 hypoglycemic neonates, 16 (42.11%) were symptomatic and 22 (57.89%) were asymptomatic. 65.79% of hypoglycemic neonates were SGA, 34.21% were AGA and no one was LGA. 89.47% of hypoglycemia occurred during the first 24 hours of life. Jitteriness was the most common clinical feature observed followed by refusal of feeding, lethargy, weak cry,cyanosis and hypotonia. Out of 38 hypoglycemic neonates, 35 (92.11%) were discharged successfully and 3 (7.89%) died.*
Conclusion: *Hypoglycemia was frequent among low birth weight babies more so in SGA babies in the first 24 hours.*

Keywords: *Hypoglycemia, LBW, SGA, AGA, LGA, RIMS.*

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I. Introduction

Glucose is the major source of energy for organ function. Although all organs can use glucose, the human brain uses it almost exclusively as a substrate for energy metabolism. Because cerebral glycogen stores are limited, maintenance of adequate glucose delivery to the brain is an essential physiologic function. The high brain to body weight ratio in the newborn results in a proportionately higher demand for glucose compared with the capacity for glucose production than that encountered in the adult.

Neonatal hypoglycemia is one of the most frequently encountered metabolic abnormalities in newborn infants. Its importance has been greatly emphasized especially in relation to acute neurological dysfunction as well as long term neurodevelopmental impairment.[1,2,3,4] Estimates of the incidence of hypoglycemia in the newborn depend both on the definition of the condition and the methods by which blood glucose concentrations are measured. The overall incidence has been estimated at 1.3-5 per 1,000 live births, but it is higher in at-risk populations.[5] Around 8% of large-for-gestational-age infants [primarily infants of diabetic mothers (IDMs)] and 15% of preterm infants and infants who have intrauterine growth retardation (IUGR) have been reported as having hypoglycemia; the incidence in the entire population of "high-risk" infants may be as high as 30%.[6]The symptomatic response of neonate to low blood glucose is variable with non-specific clinical features including pallor, lethargy, feeding difficulties, tachypnea, hypothermia, hypotonia, abnormal cry, jitteriness, apnea, coma and convulsions. Jitteriness is defined as non-jerky, stimulus-sensitive fine movements that ceases on grasping

the hands and not accompanied by abnormal ocular phenomenon. Hypoglycemia can also be presented without any apparent symptoms- the so called "asymptomatic hypoglycemia" found in neonates at risk of hypoglycemia.[7,8,9,10]

The definition of hypoglycemia in the newborn infant has remained controversial because of a lack of significant correlation among plasma glucose concentration, clinical symptoms and long-term sequelae. The operational threshold for hypoglycemia is currently believed to be a blood glucose value of < 40 mg/dl (plasma glucose < 45 mg/dl).[11] However, if the plasma glucose value is < 45 mg/dl (2.5 mmol/l) in a symptomatic infant, clinical interventions aimed to increase blood glucose are indicated and if it is < 36 mg/dl without any symptoms a close surveillance should be maintained and should be intervened if plasma glucose remains below this level or infants become symptomatic or level does not increase after feed. I.V. glucose infusion should be given when plasma glucose level is < 20-25 mg/dl (1.1-1.4 mmol/l).[12] The most effective method of preventing hypoglycemia is early breast feeding.

Low birth weight babies are defined as babies with a birth weight of less than 2500g (up to and including 2499g) irrespective of the period of gestation. These include preterm (one-third) and small-for-dates term (two-thirds). Preterm is defined as a baby with a gestation of less than 37 completed weeks (up to 36 weeks 6days or less than 259 days). Small-for dates (SFD), small-for-gestational age (SGA) or intrauterine growth retardation (IUGR) babies are defined as babies with a birth weight of less than 10th percentile for their gestational age.Large-for-dates or large-for-gestational age (LGA) babies are babies with a birth weight of more than 90th percentile for the period of their gestation. Appropriate-for-dates (appropriate-for-gestational age) babies are babies with a birth weight between 10th and 90th percentile for the period of their gestation. Term babies are babies with a gestational age between 37 and 41 weeks.Very low birth weight (VLBW) babies are defined as babies with birth weight of less than 1500 g (up to and including 1499 g). Extremely low birth weight (ELBW) babies are defined as babies with a birth weight of less than 1000 g (up to and including 999 g).Low birth weight newborns are at a higher risk for hypoglycemia as compared to normal birth weight. They are prone to develop hypoglycemia mostly during the first 24 hours after birth as shown by various studies. Hypoglycemia occurs in 50% of SGA infants, typically in the first 12 hours of life.

The incidence of low birth weight newborns in RIMS Hospital Imphal is 6%.[13] Very few studies have been conducted in the region regarding hypoglycemia in low birth weight newborns. The incidence varies with different studies based on the cut off values, population size and patient trends. So, this present study was undertaken to determine the incidence of hypoglycemia, and to assess the clinical manifestations and short term outcomes of hypoglycemia in low birth weight newborns in RIMS Hospital.

II. Aims and Objects

1. To determine the incidence of hypoglycemia in low birth weight newborns.
2. To assess the clinical manifestations and short term outcomes of hypoglycemia in low birth weight (LBW) newborns.

III. Materials and methods

This is a hospital based cross-sectional studyconducted in the Departments of Paediatrics and Biochemistry, Regional Institute of Medical Sciences, Imphal, Manipur over a period of 2 years between September 2017 to August 2019. Based on the study conducted by Saini A et al for mean prevalence of 24% for hypoglycemia in low birth weight neonates, the sample size was calculated to be 200. The study included low birth weight newborns admitted in RIMS, Imphal, Manipur.Newborns with birth weight 2500 grams or more, neonates with signs of systemic diseases/sepsis, neonates with congenital anomalies,DIC and neonates whose parents declined consent were excluded. Newborns with birth weight less than 1500g were not included in the study as these babies were associated with high morbidities like RDS, NEC, intraventricular hemorrhae (IVH), apnoea of prematurity, etc and required NICU admission. Ethical clearance was obtained from Research Ethics Board, Regional Institute of Medical Sciences, Imphal. The responsible bodies at the wards and registration room were told about the purpose of the study and verbal informed consent was secured. Confidentiality of the information was secured throughout the study process and no unauthorized body was accessed to the information.Informed consent was obtained from the parents/guardian regarding inclusion in the study. After obtaining the informed consent from the parents/guardian regarding inclusion of the neonate in the study assessment of birth weight was done. Detailed clinical examination was performed. Blood glucose level was estimated by heel prick method using Glucometer (Accu-Check One Touch) for all the newborns fulfilling the inclusion criteria at 2,6, 12, 24, 48 and 72 hours of postnatal life. Blood samples were drawn from all the babies whose blood glucose level by heel prick method was less than 40 mg/dl and sent in a fluoride vial for blood glucose level estimation by laboratory method i.e, God-pap method. Babies with blood glucose value < 40 mg/dl by both methods were considered to have hypoglycemia and observed for clinical signs and symptoms.SPSS software version-21 for Windows (IBM Corp., IL USA) was used for statistical analysis. Data

collected were checked for completeness and data were entered in SPSS versio-21 for Windows (IBM Corp, IL USA).Descriptive statistics like mean standard deviation and percentages were used. The data obtained were tabulated and were analyzed by using SPSS Software Version-21 for Windo. *p* value < 0.05 was considered significant.

IV. Results and observations

In the present study, 200 newborns with birth weight less than 2500g were studied. Newborns with birth weight less than 1500g were not included in the study as these babies were associated with high morbidities like RDS, NEC, intraventricular hemorrhae (IVH), apnoea of prematurity, etc and required NICU admission.

Gender	Number of newborns(n=200)	Percentage (%)
Male	110	55
Female	90	45
Total	200	100

Table 1: Distribution of newborns studied in relation to gender (n=200)

Gestational age	Number of newborns (n=200)	Percentage (%)
Preterm	179	89.5
Term IUGR	21	10.5
Total	200	100

Table 2: Distribution of newborns studied according to gestational age (n=200)

Gestational Size (Based on Ponderal Index)	Number of newborns (n=200)	Percentage
Appropriate for gestational age (AGA)	146	73
Small for gestational age (SGA)	54	27
Large for gestational age (LGA)	0	0
Total	200	100

Table 3: Distribution of newborns according to gestational size based on Ponderal Index (n=200)

Hypoglycemic status	Number of newborns(n=200)	Percentage (%)
Hypoglycemia present	38	19
Hypoglycemia absent	162	81
Total	200	100

Table 4: Distribution of newborns studied according to hypoglycemic status (n=200)

Symptomatic or asymptomatic hypoglycemia	Number of hypoglycemic newborns (n=38)	Percentage (%)
Asymptomatic	22	57.89
Symptomatic	16	42.11
Total	38	100

Table 5: Distribution of hypoglycemia in newborns (n=38)

Table 6: Distribution of glycemic status in relation to gender (n=200)

Glycemic status of newborns	Gender of Newborns		Total	p value
	Male	Female		
Hypoglycemia present	21	17	38	0.971
Hypoglycemia absent	89	73	162	
Total	110	90	200	

Table 6 shows the distribution of hypoglycemic neonates in relation to gender. Out of 38 hypoglycemic newborns, 21 (55.26%) were male newborns and 17 (44.74%) were female newborns. After formulating a 2x2 table to test the significance , Chi-square test was applied and the p value was found to be 0.971 which was statistically insignificant. This shows that there is no significant relationship between the gender and the incidence of hypoglycemia in low birth weight newborns.

Glycemic status	Gestational Age				Total
	<32 weeks	32-34 weeks	34-36 weeks	>36 weeks	
Hypoglycemic	6	17	14	1	38
Normoglycemic	13	49	70	30	162
Total	19	66	84	31	200

Table 7 : Distribution of glycemic status of newborns in relation to gestational age (n=200)

Table 7 shows distribution of glycemic status in relation to gestational age. Hypoglycemia was noted in 6 of 19 (31.58%) newborns with gestational age <32 weeks, 17 of 66 (25.76%) newborns with gestational age 32-34 weeks, 14 of 84 (16.67%) of newborns with gestational age 34-36 weeks and 1 of 31 (3.23%) of newborns with gestational age > 36 weeks. After formulating a 2x4 table to test the significance , Chi-square test was applied and the p value was found to be 0.026492 which was statistically significant. This shows that there is a significant relationship between the gestational age and the incidence of hypoglycemia in low birth weight newborns.

Day of Life (in hours)	**Number of Hypoglycemic Newborns**	**Percentage (%)**
2 Hours of Life	10	26.30
6 Hours of Life	10	26.30
12 Hours of Life	9	23.73
24 Hours Of Life	5	13.15
48 Hours of Life	2	5.26
72 Hours of Life	2	5.26
Total	38	100

Table 8: Distribution of hypoglycemia according to day of life (n=38)

Table 8 shows that maximum number of hypoglycemia (34 of 38, 89.47%) occurred during the first 24 hours of life. Out of 38 hypoglycemia episodes, 10 (26.30%) occurred at 2 hours of life, 10 (26.30%) at 6 hours, 9 (23.73%) at 12 hours, 5 (13.15%) at 24 hours, 2 (5.26%) at 48 hours and 2 (5.26%) at 72 hours of postnatal age.

Hypoglycemic status of newborns	**Birth weight of newborns**			**Total**	**p value**
	1000g-1499g	1500g-1999g	2000g-2499g		
Hypoglycemia present	20	15	3	38	0.004741
Hypoglycemia absent	42	90	30	162	
Total	62	105	33	200	

Table 9: Distribution of Hypoglycemic status in relation to birth weight of newborns (n=200)

Table 9 shows distribution of glycaemic status of newborns in relation to birth weight. Out of 62 newborns with birth weight 1000g-1499g, 20(32.26%) were hypoglycemic, 15 of 105 (14.29%) of newborns with birth weight 1500g- 1999g and 3 of 33 (9.09%) of newborns with birth weight 2000g-2499g were hypoglycemic. After formulating a 2x3 table to test the significance , Chi-square test was applied and the p value was found to be 0.004741 which was statistically significant. This shows that the a significant relationship exists between the birth weight and the incidence of hypoglycemia in low birth weight newborns.

Table 10: Distribution of glycemic status in relation to types of low birth weight (n=200)

Hypoglycemic status	Types of low birth weight		Total	**p value**
	Preterm	**Term IUGR**		
Hypoglycemia present	33	5	38	0.0368
No hypoglycemia	156	6	162	
Total	189	11	200	

Table 10 shows distribution of glycaemic status in relation to types of low birth weight. 33 of 189 (17.46%) of preterm low birth weight newborns and 5 of 11 (45.45%) of term IUGR low birth weight newborns were hypoglycemic. After formulating a 2x2 table to test the significance , Chi-square test was applied and the p value was found to be 0.0368 which was statistically significant. This shows that the a significant relationship exists between the types of low birth weight and the incidence of hypoglycemia in low birth weight newborns.

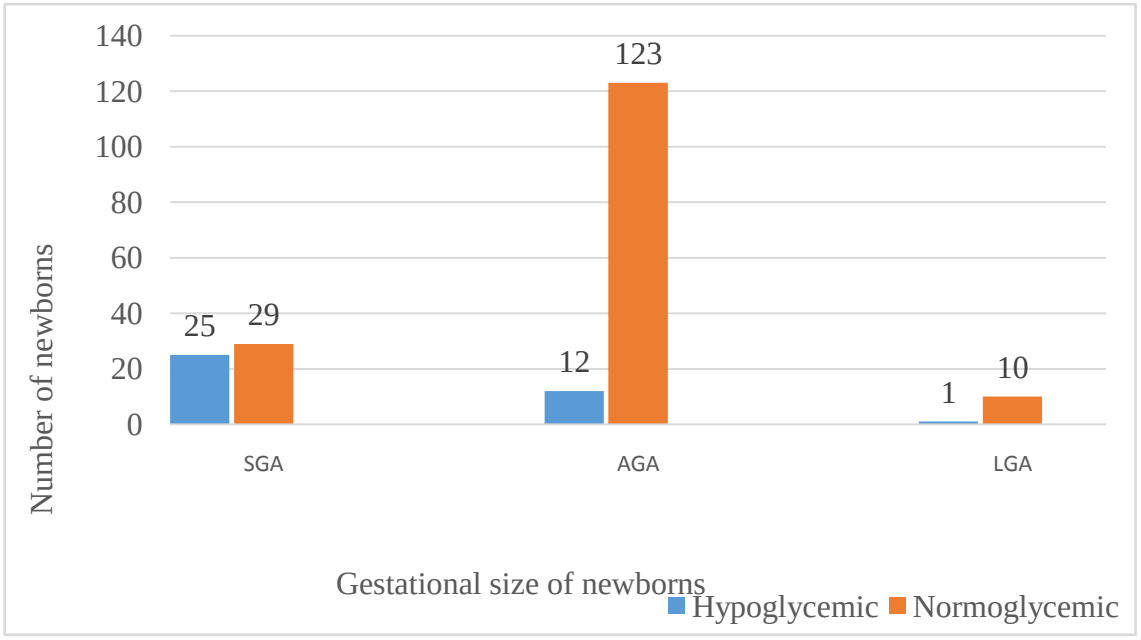

Figure 1: Distribution of glycemic status of newborns in relation to gestational size (n=200)

Figure 1 shows distribution of glycaemic status of newborns in relation to gestational size. Hypoglycemia was seen in 25 (46.30%) of 54 SGA, 12 (8.89%) of 135 AGA newborns an 1 of 11 (9.09%) LGA newborns. After formulating a 2x3 table to test the significance , Chi-square test was applied and the p value was found to be <0.00001 which was statistically significant. This shows that the a significant relationship exists between the gestational size and the incidence of hypoglycemia in low birth weight newborns.

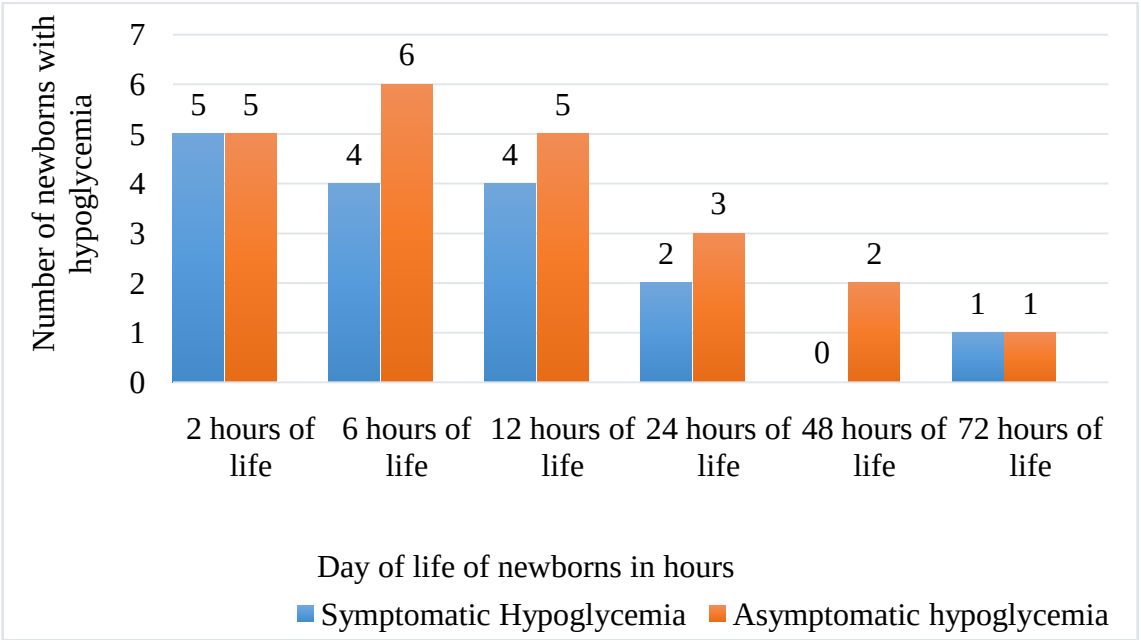

Figure 2: Distribution of symptomatic and asymptomatic hypoglycemia in relation to day of life (n=38).

Figure 2 shows that maximum number of hypoglycemia (34 of 38, 89.47%) occurred during the first 24 hours of life. Out of 38 hypoglycemia episodes, 10 (26.30%) occurred at 2 hours of life, 10 (26.30%) at 6 hours, 9 (23.73%) at 12 hours, 5 (13.15%) at 24 hours, 2 (5.26%) at 48 hours and 2 (5.26%) at 72 hours of postnatal age.

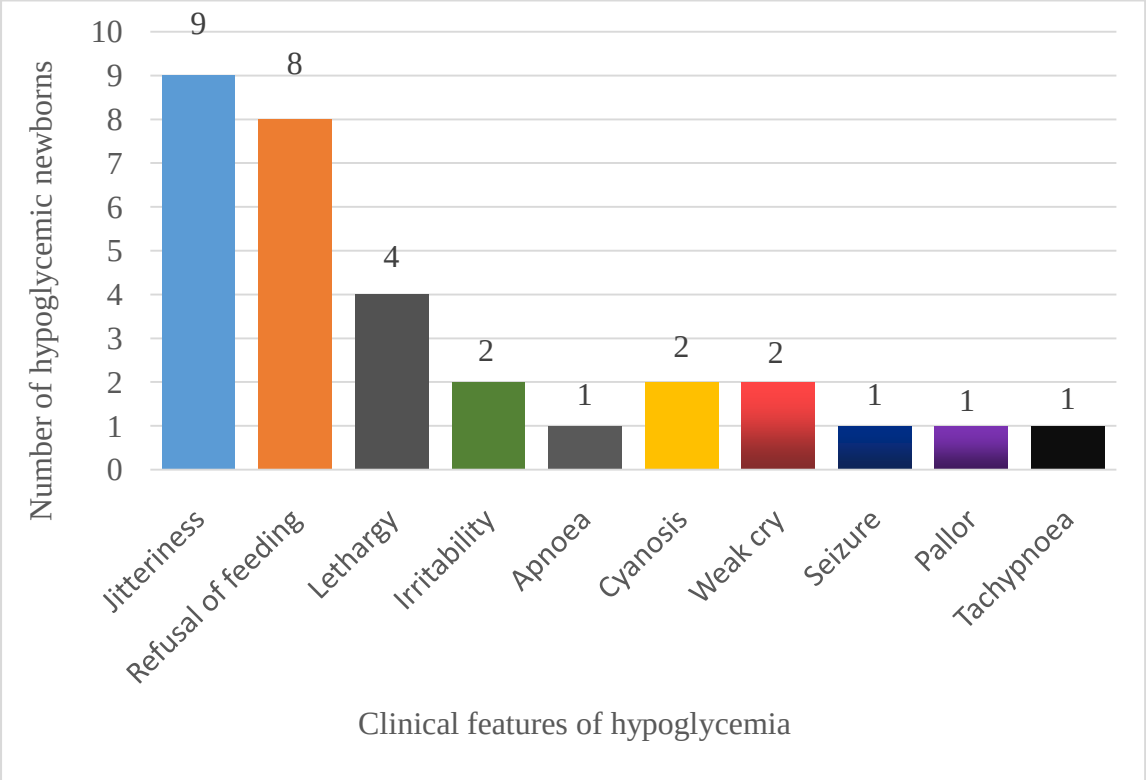

Figure 3: Distribution of clinical features of hypoglycemia in symptomatic neonates (n=16)

Figure 3 shows distribution of clinical features in neonates with symptomatic hypoglycemia. Most of the symptomatic cases had jitteriness (56.25%) followed by refusal of feeding (50%), lethargy (25%), weak cry (12.5%), irritability (12.5%), cyanosis (12.5%), pallor (6.25%), apnoea (6.25%), tachypnoea (6.25%) and seizure (6.25%).

Outcome of hypoglycemia	Frequency (n=38)	Percentage
Discharged successfully without sequelae	35	92.11
Death	3	7.89
Total	38	100

Table 11: Outcome distribution in neonates with hypoglycemia(n=38)

Table 11 shows outcome distribution in neonates with hypoglycemia. Out of 38 hypoglycemic neonates, 35 (92.11%) neonates were discharged without any sequelae and 3 (7.89%) hypoglycemic neonates died. Out of 3 hypoglycemic neonates who died, 2 (66.67%) had symptomatic hypoglycemia and 1 (33.33%) had asymptomatic hypoglycemia, which was statistically insignificant (p=0.3693).

V. Discussion

Hypoglycemia is the commonest metabolic disorder of neonates. If not detected in time, it can lead to considerable morbidity and mortality. Hypoglycemia both symptomatic and asymptomatic can lead to long term neurological sequelae. Therefore, it needs urgent management to prevent brain damage in neonates. Low birth weight babies especially SGA babies are at very high risk of developing hypoglycemia due to intrauterine malnutrition.

In the present study, a total of 200 newborns with birth weight less than 2500 g were studied. Newborns with birth weight less than 1000 g were not included in the study as they required NICU admission. Out of 200 newborns studied, 110 (55%) were males and 90 (45%) were females; 135 (67.5 %) AGA, 54 (27%) SGA and 11 (5.5%) LGA; 189 (94.5%) preterm and 11 (5.5%) term IUGR. Out of 200 newborns, 52.5% had birth weight 1000g-1499g, 31% had birth weight 1500g-1999g and 16.5% had birth weight of 2000g-2499g. Mean±SD birth weight of the newborns was 1709.53±340.62g.

In the present study, the incidence of hypoglycemia in low birth weight neonates is 19%, which is similar to the finding reported by Lubchenbo LO et al1[4]. Different studies in literature have reported varying incidences. Singh YP et al[15]study showed incidence of hypoglycemia in low birth weight newborns 29.5%, Kumar TJ et al[16] showed 28%, Saini A et al[17] showed 24% and De AK et al[18] showed 64.8% incidence of

hypoglycemia in low birth weight newborns. Meyur R et al[19] reported the incidence of hypoglycemia to be 52.77%. This high incidence of hypoglycemia reported by Meyur R et al[19] could be due to higher cut off (hypoglycemia was defined as blood glucose level <50 mg/dl).

In the present study, out of 38 hypoglycemic neonates 16 (42.11%) were symptomatic and 22 (57.89%) were asymptomatic. This finding is similar to the finding reported by Swain A et al[20] where 41.28% neonates with hypoglycemia were symptomatic and 58.82% were asymptomatic. Gutberlet RL et al[21] also reported 59.8% cases to be asymptomatic, which is similar to the finding observed in the present study.

In the present study, 21 (19.09%) of 110 males and 17 (18.89%) of 90 females were hypoglycemic, which was statistically insignificant. Singh YP et al[15] reported hypoglycemia to be more common in males 11 (32.7%) of 65 male babies, as compared to females 08 (13.33%) of 60 female babies. Khan I et al[22] also reported higher incidence of hypoglycemia in male babies compared to female babies (32.7% vs 21.7%, p=0.04). This higher incidence of hypoglycemia in male newborns could be due to higher number of male newborns (male:female = 1.22:1).

In the present study, the incidence of hypoglycemia is more in preterm newborns (17.46%) than term IUGR (45.45%).The similar finding was reported by Manjunatha BR et al[23] in their prospective observational study.

In the present study, the incidence of hypoglycemia is more in neonates with lower birth weight. Out of 62 newborns with birth weight 1000g-1499g, 20 (32.26%) were hypoglycemic, 15 of 105 (14.29%) of newborns with birth weight 1500g- 1999g and 3 of 33 (9.09%) of newborns with birth weight 2000g-2499g were hypoglycemic. After formulating a 2x3 table to test the significance , Chi-square test was applied and the p value was found to be 0.004741 which was statistically significant. This shows that the a significant relationship exists between the birth weight and the incidence of hypoglycemia in low birth weight newborns. Similar findings were found by Amarendra M et al.[24]Thus, it can be concluded that lower the birth weight, the greater will be the risk of hypoglycemia.

In the present study, 65.79% (12 of 38) of hypoglycemic neonates were small for gestational age (SGA), 31.58% (25 of 38) were appropriate for gestational age (AGA) and 2.63% (1 of 38) were LGA.. 25 of 54 (46.3%) SGA newborns, 12 of 135 (8.89%) AGA neonates and 1 of 11 (9.09%) LGA neonates were hypoglycemic, which was of significant difference with p value of <0.00001 which indicates that gestational size is an important determinant of hypoglycemia. Various studies have analysed gestational size as a determinant for hypoglycemia. Tenovuo A[25] in 1988 concluded a fivefold risk for hypoglycemia was seen in SGA infants. Holtrop PC[26] studied the frequency of hypoglycemia in large for gestational age infants as 8.1% and in small for gestational age infants to be 14.7%. More hypoglycemia was reported in small for gestational age than large for gestational age. Saini A et al[17] reported that 58.3% of hypoglycemic neonates were small for gestational age (SGA) and 41.7% were AGA. Kumar TJ et al[16] reported the incidence of hypoglycemia in SGA babies to be 42%. Karahasanoglu O et al[27] studied the frequency of hypoglycemia in small for gestational age neonates was significantly higher (p=0.009) than in appropriate for gestational age neonates. In Bhat MA et al[28] study, the incidence of hypoglycemia was 25.2% in SGA babies. De AK et al[18] study showed incidence of hypoglycemia in SGA was 64.2%, but the population size was very small. Holtrop PC[26] had excluded newborns of diabetic mothers and their newborns were not exclusively breastfed. Bhat MA et al[28] included all SGA newborns, whether breastfed, formula-fed, or on intravenous fluids. These factors could have lowered the incidence of hypoglycemia in their studies. High incidence of hypoglycemia in SGA in the present study can be explained due to high risk pregnancies managed in our institution. Burdan DR et al[29] analysed that small for gestational age preterm neonates are at greater risk of neonatal hypoglycemia. Yoon JY et al[30] concluded that SGA were at risk of hypoglycemia both within 24 hours and during 2nd to 7th day of life. Results of present study matches with results of the studies indicating small for gestational age as a significant determinant for hypoglycemia. Increased risk of hypoglycemia in SGA infants can be explained by decreased glycogen stores, increased insulin sensitivity and higher energy requirements.[49]

In the present study, 10 (26.32%) cases of hypoglycemia were detected at 2 hours, 10 (26.32%) at 6 hours, 9 (23.68%) at 12 hours, 5 (13.16%) at 24 hours, 2 (5.26%) at 48 hours and 2 (5.26%) at 72 hours of life. Out of 38 , 34 (89.47%) of hypoglycemia were observed during the first 24 hours of life. This finding is similar to the finding observed by various studies. Mazumdar MW et al[31] reported 57.9% of hypoglycemia during 0-12 hours of postnatal age. Kumar TJ et al[16] reported almost (51%) half of the hypoglycemia at 2 hours of life, 31% at 6 hours, 16% at 12 hours and 2% at 24 hours of life and no hypoglycemic events were noted beyond 24 hours. Harris DL et al[32] reported maximum cases of hypoglycemia (81%) in the first 24 hours of life. Hawdon JM et al[33] reported that the mean blood glucose concentration of preterm infants was significantly lower on the first day than on subsequent days. Likewise, in a study by Bhat MA et al[28] on SGA babies, almost all the episodes of hypoglycemia occurred within 24 hours. Swain A et al[20] reported that in 12.38%, 54.59%, 16.51% and 28.90% cases of neonatal hypoglycemia, the onset was within 2 hours, within 24 hours, on day-2

and on day-3 after birth respectively. This suggests the need for constant monitoring of blood glucose values in the first 72 hours specially in the first 24 hours of postnatal age.

Hypoglycemia can have variable clinical presentation. In the present study, the most common symptom observed was jitteriness (56.25%), followed by refusal of feeding (50%), lethargy (25%), weak cry (12.5%), hypotonia (12.5%), cyanosis (12.5%), irritability (12.5%), seizure (6.25%), apnea (6.25%), hypothermia (6.25%), pallor (6.25%), tachypnoea (6.25%) and sweating (6.25%). Singh YP et al[15]also observed jitteriness as the most common symptom of hypoglycemia in their cross sectional study. Manjunatha BR et al[23] reported the major clinical manifestations of hypoglycemia as jitteriness, lethargy, convulsion and apneic spells. Dashti N et al[34] reported the clinical features significantly associated with hypoglycemia as refusal of feeding, hyporeflexia, irritability, cyanosis, tachypnoea, seizure, weak cry, apneic spells, pallor, cardiac arrest and sweating. In the study conducted by Dhananjaya CD et al[35], the common clinical features of hypoglycemia were lethargy (81.25%), jitteriness (75%), respiratory abnormalities (37.5%), cyanosis (18.75%) and seizures (9%). Similar spectrum of clinical features was also noted by Singhal PK et al[36.] In Khan I et al[22] study, the clinical features reported included feeding difficulty (72.7%), jitteriness (62.7%), seizures (37.3%), respiratory distress (34%), lethargy (30%), hypotonia (27.3%), hypothermia (26.7%), abnormal cry (20%), poor respiration (14%) and apnea (17.3%). In the study conducted by Bhand SA et al[37], the clinical presenting features were jitteriness (38%), cyanosis (23%), temperature instability (32%) and lethargy (25%). In the study conducted by Swain A et al[20], the commonest clinical presentation oberved was jitteriness and tremor followed by lethargy, poor feeding, tachynea and cyanosis with apnea.

In the present study, 35 out of 38 (92.11%) hypoglycemic neonates were discharged without any neurological sequelae and 3 (7.89%) hypoglycemic neonates died. Similar finding was reported in the study conducted by Sethy G et al[38] where 78.43% hypoglycemic neonates were completely cured, 13.72% were referred and 7.84% died. In the study conducted by Swain A et al[20], majority cases (91.28%) were discharged and death occurred in 7.80% while some babies were discharged with some sequelae.

VI. Conclusion

Hypoglycemia is a common preventable and neglected problem in developing countries. Despite serious consequences and years of investigations into its characteristics, the definition of hypoglycemia remains elusive. According to our observation, the incidence of hypoglycemia in low birth weight neonates is 19%. Small for gestational age is a significant determinant of hypoglycemia. Hypoglycemic episodes were significantly noticed in the first 24 hours of life as compared to other time interval. Jitteriness was found to be the most common clinical feature in the present study. Considering the results of this study as well as the studies done earlier, low birth weight newborns specially small for gestational age (SGA) neonates should be screened at regular interval for blood glucose level more specifically at first 24 hours of life to prevent the sequelae of hypoglycemia. Further studies on a larger population are needed to fully understand the common consequences and prevent the short term outcomes of hypoglycemia in low birth weight newborns.

References

[1]. Srinivasan G, Pildes RS, Cattamanchi G, Voora S, Lilien LD. Plasma glucosevalues in normal neonates: a new look. J Pediatr 1986;109(1):114-7.
[2]. Cornblath M, Reisner SH. Blood glucose in the neonate and its clinical significance. N Engl J Med 1965;273(7):378-81.
[3]. Rozance PJ, Hay WW. Hypoglycemia in newborn infants: features associated with adverse outcomes. Biol Neonate 2006;90(2):74-86.
[4]. Burns CM, Rutherford MA, Boardman JP, Cowan FM. Patterns of cerebral injury in neurodevelopmental outcomes after symptomatic neonatal hypoglycemia. Pediatrics 2008;122(1):65-74.
[5]. Barbara N. State of the science: Neonatal hypoglycemia beyond the basics. Adv Physio Care Concept 2001;1(1):212-6.
[6]. Williams AF. Hypoglycaemia in newborn : A review. WHO Publication 1997; 75(3):261-90.
[7]. Sperling MA, Menon RK. Differential diagnosis and management of neonatal hypoglycemia. Pediatr Clin North Am 2004;51(3):703-23.
[8]. Memon S, A Memon MM. Spectrum and immediate outcome of seizures in neonates. J Coll Physicians Surg Pak 2006;16(11):717-20.
[9]. Kalhan S, Peter-Wohl S. Hypoglycemia: What is it for the neonate? Am J Perinatol 2000;17(1):11-4.
[10]. Moore AM, Perlman M. Symptomatic hypoglycemia in otherwise healthy breastfed newborns.Pediatrics 1999;103(4):837-9.
[11]. Narayan S, Aggarwal R. Hypoglycaemia in newborns. Indian J Pediatr 2001; 68(10):963-5.
[12]. Cornblath M, Hawdon JM, Williams AF, Aynsley-Grean A, WardPlatt MP, Schwartz R, Kalhan S. Controversies `regarding definition of neonatal hypoglycaemia- suggested operational threshold. Pediatrics 2000;105(5):1141-5.
[13]. Sunilbala K, Chaudhuri A, De D, Singh KI. Assessment Of factors associated with low birth weight babies born in RIMS hospital.IOSR-JDMS 2015;14(11):01-03.
[14]. Lubchenco LO, Bard H. Incidence of hypoglycemia in newborn infants classified bybirth weight and gestational age. Pediatrics 1971;47(5):831-8.
[15]. Singh YP, Devi TR, Gangte D, Devi TI, Singh NN, Singh MA. Hypoglycemia innewborn in Manipur. J Med Soc 2014;28(2):108-11.
[16]. Kumar TJ, Vaideeswaran M, Seeralar AT. Incidence of hypoglycemia in newborns withrisk factors. Int J Contemp Pediatr 2018;5(5):1952-5.
[17]. Saini A, Gaur BK, Singh P. Hypoglycemia in low birth weight neonates: frequency,pattern, and likely determinants. Int J Contemp Pediatr. 2018;5(2):526-32.

[18]. De AK, Biswas R, Samanta M, Kundu CK. Study of blood glucose level in normal and lowbirth weight newborns and impact of early breastfeeding in a tertiary care centre. Ann Nigerian Med 2011;5(2):53-8.
[19]. Meyur R, Sadhu A, Bhakta A, Bandhyopadhyaya M, Kundu B, Bhaumik S et al. Incidence and causes of neonatal hypoglycemia after cesarean section in rural set up of West Bengal. JEMDS 2014;3(5):1191-94.
[20]. Swain A, Das K, Tripathy SK, Behera S, Satpathy SK. Study of morbidity pattern ofhypoglycemia in neonatesadmitted to a tertiary care centre-An experience of two years.EJPMR 2017;4(7):497-502.
[21]. Gutberlet RL,Cornblat M. Neonatal hypoglycemia revisited,1975. Pediatrics.1976 Jul;58(1):10-17.
[22]. Khan I, Muhammad T, Khan MQ. Frequency and clinical characteristics of symptomatichypoglycemia in neonates.
[23]. Gomal Journal of Medical Sciences 2010;8(2):117-20.
[24]. Manjunatha BR, D'Souza JLP, Susheela C. Study of incidence, clinical profile and riskfactors of neonatal hypoglycemia in a tertiary care hospital. Int J Pediatr Res 2016;3(10):753-7.
[25]. Amarendra M, Sethi RK, Pericherla VP. Incidence of hypoglycaemia within 72 hoursafter birth in low birth weight babies who are appropriate for gestational age. Int JContemp Pediatr 2018;5(3):944-8.
[26]. Tenovuo A. Neonatal complications in small for gestational age neonates. JPerinat Med.1988;16(3):197-203.
[27]. Holtrop PC. The frequency of hypoglycaemia in full term large and small for gestationalage newborns.Am J Perinatol 1993;10(2):150-4.
[28]. Karasahanoglu O, Karetekin G, Kose R, Nuhoglu A. Hypoglycemia in small for gestational age neonates. Turk J Pediatr 1997;39(2):159-64.
[29]. Bhat MA, Kumar P, Bhansali A, Majumdar S, Narang A. Hypoglycaemia in small forgestational age babies. Indian J Pediatr 2000;67(6):423-7.
[30]. Burdan DR, Botiu V, Teodorescu D. Neonatal hypoglycemia. The incidence of the riskfactors in Salvator Vuia obstetrics gynecology hospital, Arad. TMJ. 2009; 59(1):77-80.
[31]. Yoon JY, Chung HR, Choi CW, Yang SW, Kim BI, Shin CH.Blood glucose levelswithin 7 days after birth in preterm infants according to gestational age. AnnPediatrEndocrinol Metab. 2015 Dec;20(4):213-9.
[32]. Mazumdar MW, Begum N, Mannan MA. Study of blood glucose and serum calciumlevel in small for gestational babies. JSS Med Coll 2012;4(2):50-4.
[33]. Harris DL, Weston PJ, Harding JE. Incidence of neonatal hypoglycemia in babiesidentified as at risk. J Pediatr 2012;161(5):787–91.-32.
[34]. Hawdon JM, Ward Platt MP, Aynsley-Green A. Patterns of metabolic adaptation forpreterm and term infants in the first neonatal week. Arch Dis Child 1992;67(4):357-65.
[35]. Dashti N, Einollahi N, Abbasi S. Neonatal hypoglycemia: Prevalence and clinicalmanifestations in Tehran Children's Hospital. Pak J Med Sci 2007;23(3):340-3.
[36]. Dhananjaya CD, Kiran B. Clinical profile of hypoglycemia in newborn babies innewborn infants in Nepal. J Trop Pediatr 1993;39(5):273-7.
[37]. Singhal PK, Singh M, Paul VK, Deorari AK, Ghorpade MG, Malhotra A.Hypoglycemiaclinical profile and glucose requirements. Indian Pediatrics 1992; 29(2):167-71.
[38]. Bhand SA, Sheikh F, Siyal AR, Nizamani MA, Saeed M. Neonatal Hypoglycemia;Presenting pattern and risk factors of neonatal hypoglycemia.Professional Med J2014;21(4): 745-49.

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