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Original Research Article

A study of asymptpmatic hypoglycemia in at risk newborn babies admitted at a tertiary care hospital

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ABSTRACT

Introduction: Babies often have blood glucose levels that are 70% of their mothers at birth. Within an hour, it reaches its lowest point, which can be as low as 20 to 25 mg/dl. All healthy newborns experience this low point and have lower than average blood glucose levels. These are just temporary, and they gradually increase in the first few days of a newborn's life.
Aim & Objective: To determine the proportion of asymptomatic hypoglycemia in at risk newborn babies. To study plasma sugar level at various time, point during first 48hr of life and the effect of risk factor associated with asymptomatic hypoglycemia.
Materials and Methods: A Hospital-based longitudinal observational study was conducted among 303 patients at Department of Pediatrics of tertiary care Hospital during June 2021 – July 2021.
Result: Total 159 were males and 154 were females. Among the study participants, 203(83%) cases were from Urban area, while 50(17%) were from Rural area. No. of 114(37.6%) babies had asymptomatic hypoglycemia, identified by routine screening. In total various risk factors was found in which among 29% cases had LGA, 41% had preterm and 30% had weight less than 2 kg.
Conclusion: Screening of at risk newborn helps in the early detection of asymptomatic hypoglycemia which will help in the prevention of adverse neurodevelopmental outcome. Routine screening helped to decrease morbidity and mortality due to hypoglycemia. The first 24 hours of life is a crucial part, at - risk babies are more prone to hypoglycemia hence routine screening is recommended in high-risk babies.

1. Introduction

Glucose is the main source of fuel for brain cells and is required by all mammalian organisms. Low blood sugar, or hypoglycemia, is a common metabolic issue in newborns. The placenta provides a constant supply of glucose to the fetus throughout intrauterine life. This delivery of glucose from the mother abruptly stops when the umbilical cord is cut at birth. Therefore, the newborn must store glucose for use during times of fasting and between spaced-out feedings.[1] Episodic hypoglycemia can develop as a newborn makes the switch from a continuous transplacental source of glucose to an intermittent oral supply.[2] Hypoglycemia may be exacerbated by the immaturity of adaptive systems such as gluconeogenesis, glycogenolysis, and ketogenesis.[3] The World Health Organization (WHO) defines hypoglycemia as a blood glucose level of less than 40mg/dL (plasma glucose level less than 45mg/dL). Risk factor include Infant of diabetic mother, large for gestational age (>90th percentile), small for gestational age (10th percentile), low birth weight (>1800 to 2500 grams), and premature (35-37 weeks).[4] After 20 weeks of pregnancy, a fetal glucose content of 54 mg/dL is considered the usual

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lower limit.[5,6] Babies often have blood glucose levels that are 70% of their mothers' at birth. Within an hour, it reaches its lowest point, which can be as low as 20 to 25 mg/dl.[7] All healthy newborns experience this low point and have lower than average blood glucose levels. These are just temporary, and they gradually increase in the first few days of a newborn's life. This is a perfectly natural adjustment for the postnatal period, and it aids in putting in place postnatal glucose homeostasis.[7–9] Different authors have reported varying incidence rates across a range of birth weight and gestational age categories.[10]Hypoglycemia affects anywhere from 0.2% to 11.4% of newborns. However, the likelihood of hypoglycemia increases dramatically in the presence of specific risk factors, such as tiny for date, large for date, newborns of diabetic mothers, premature birth, etc.[11,12] It is believed to affect about 16% of newborns who are born large for their gestational age (LGA) and 15% of babies who are born short for their gestational age (SGA).[13] Newborns can have both symptomatic and asymptomatic forms of hypoglycemia. It was revealed that between 12 and 14 percent of newborns born at full term have asymptomatic hypoglycemia.[14,15] Symptoms of hypoglycemia are nonspecific and include agitation, apathy, cyanosis, convulsions, apneic spells, a weak or high-pitched cry, limpness (or) lethargy, trouble feeding, and hypothermia.[16] Hence the present study was conducted to study asymptomatic hypoglycemia in at risk newborn babies admitted at a tertiary care center.

2. Aim & Objectives

To determine the proportion of asymptomatic hypoglycemia in at risk newborn babies. To study plasma sugar level at various time, point during first 48hr of life and the effect of risk factor associated with asymptomatic hypoglycemia.

3. Materials and Methods

A Hospital-based longitudinal observational study was conducted among 303 patients at Department of Pediatrics of tertiary care Hospital during June 2021 – July 2021. All high-risk newborn babies (preterm infants, SGA, IGA, Birth weight < 2kg, sick infant (sepsis, asphyxia) admitted to NICU of Tertiary Care Center included in the study. Term healthy AGA infant without any risk factors, Parents not willing to participate in the study and out born patients were excluded. Sample size calculation – Sample size was 303 (all hypoglycemic patients). Data of history, examination, diagnosis investigation, treatment was recorded in proforma. After proper aseptic measure blood glucose (one drop of blood) was taken. Capillary blood glucose was collected by heel prick using needle and the sample was analyzed on reagent strip. This study was approved by Institutional Ethical Committee of this institute. Written informed consent was taken prior to the study of each participant. Data collection and analysis: Data was collected by case record form and entered into MS excel 2016. Data analysis was done in SPSS Software version 26. Qualitative data were represented as frequency and percentages, while Quantitative data were described as a Mean and Standard deviation and analyzed by paired t test and ANOVA test. P-value less than 0.05 was considered as a statistical significance.

4. Results

Out of total 303, 144(48%) and 159(52%) were Females and Males, respectively.

Majority participants had less than 2 kg birth weight and Mean Birth weight was 1.67 + 0.51 kg. Mean DOL (Day of life) among study participants was 1.02 + 0.2 days. Mean Duration Gap between Hospital Admission and Discharge was 6.42 + 5.45 days. In the study, mean maternal age at a time of Hospital admission was 24.60 + 4.21 years. All mothers were below 30 years of age. Mean Mother Weight was 54.51 + 8.2 kg. Overall age at time of marriage was 20.78 + 3.47 years. [Table 1]

In total various risk factors was found in which among 29% cases had LGA, 41% had preterm and 30% had weight less than 2 kg.

Out of total, 91% participants were discharged after get well. Total 7% cases were DAMA due to their personal reasons and 2% cases were died due to complications and secondary infection.

There was significant difference found between increase no. of parity and intravenous glucose level of neonates within 24 hours of birth. There was significant difference found between preterm maturity of neonates and intravenous glucose level of neonates within 24 hours of birth. There was no significant difference found between history of APH (antepartum haemorrhage) in mother and intravenous glucose level of neonates within 24 hours of birth. There was significant difference found between history of GDM (gestation diabetic mother) and intravenous glucose level of neonates within 24 hours of birth. [Table 2]

Overall incidence of Hypoglycaemia was 37.6%. In various risk factors incidence of hypoglycaemia, in LGA – 20.2%, in Preterm -39.5%, in LBW- 46.6%, in H/o preeclampsia – 40%, in H/o GDM – 16.6%. [Table 3]

5. Discussion

In our study, males were more than females and similar results were found in Kumar et al,[4] Thirumalaikumarasamy S et al[17] and Samayam P et al[19] studies. In Kumar et al study 1035 were males and 848 were females, while in Thirumalaikumarasamy S et al study 190 were males and 210 were females. In the study of Samayam P et al 52 were males and 46 were females. In this study of Kumar et al,[4]

Table 1: Maternaland Birth Weight, DOL and Duration of Hospital Stay of Patients (n=303)

Variable	Mean + SD
Birth Weight	1.67 + 0.51
DOL (Day of life)	1.02 + 0.2
Duration of Hospital Stay	6.42 + 5.45
Maternal Age	24.60 + 4.21
Mother Weight	54.51 + 8.2
Age at Marriage	20.78 + 3.47

Table 2: Comparison between various variables and Mean Intravenous Glucose level of study Participants (n=303) [Anova test]

Variables		IV glucose at 2 hours	IV glucose at 6 hours	IV glucose at 12 hours	IV glucose at 24 hours	p-value
Parity	0	56.58+10.14	54.77+10.92	55.33+2.3	60.73+14.43	0.128
	1	64.58+14.57	68.12+17.57	56+2	64.9+15.2	0.458
	2	54.25+13.35	61+12.36	52+5.2	60.83+16.56	0.002
	>3	56.92+14.36	51.41+14.9	43+1.73	56.19+18.17	0.004
Maturity	Preterm	68.25+19.09	59.62+11.96	61.17+15.49	59.62+11.96	0.001
APH	Present	59.2+11.6	57.33+14.45	56.67+9.21	55.83+9.04	2.14
	Absent	64.39+15.9	59.05+13.61	59.58+14.27	55.44+16.03	0.71
GDM	Present	58.8+10.82	62+12.57	50.6+7.53	66.3+14.35	0.041
	Absent	64.37+15.88	59.47+13.59	59.73+14.33	55.25+15.99	0.002

Table 3: Incidence of Hypoglycaemia in various risk factors

Variable	Incidence of Hypoglycaemia (%)
Overall (n=303)	114(37.6)
LGA (n=89)	18(20.2)
Preterm (n=124)	49 (39.5)
LBW (2kg) (n=90)	42 (46.6)
H/o Preeclampsia (n=10)	4 (40)
H/o GDM (n=6)	1(16.6)

mean age was 38 in more than 30 years of age group and 18 years in less than 30 years of age group. In present study mean age of study participants was 24.60 years. In study of Samayam P et al[18] mean age of patients was 25.14 years. In our study, majority mother had multipara and similar findings were observed in other researches also. Mostly 174 were multipara, while remaining 129 were primipara. In Kumar et al[4] research 1076 were Primipara and 807 were multipara. Though in study of Thirumalaikumarasamy S et al[17] multipara were more than primipara. In research of Samayam P et al[18] 26 were Primipara and 74 were multipara women. In current research, no. of normal vaginal delivery was more than LSCS, while in Kumar et al[4]and Samayam P et al[18]studies in which LSCS was more than normal delivery. Similar finding like our study was found in Thirumalaikumarasamy S et al[17]it was due to different geographical reasons, and the presence and indications of high-risk mothers. In our study Hypertension and Diabetes comorbidities was lesser in no. compared to P singh et al[19] study. In present study, 17 and 6 patients had history of comorbidities like Hypertension & Diabetes mellitus, respectively. In P Singh et al study, 21 cases had history of Hypertension and 35 cases had history of Diabetes mellitus. Similar finding of our studies of mean blood glucose level at 2, 6, 12 and 24 hours was found in other same studies. The mean Glucose level was more at 6 hours of birth in our study, while in Thirumalaikumarasamy S et al[17] study, mean glucose level was increased at 24 hours of birth. In Kumar et al[4] study 51% change in Mean glucose level within 1 hour of birth. In Samayam P et al[18] study, mean blood glucose level was increased at 24 hours of birth. In our study, mortality rate was compared less as compared to Stomnaroska et al[20] study. In that study, only 2.38% mortality noted and 97.62% cases were discharged.

6. Conclusion

In various risk factors incidence of hypoglycemia, in LGA – 20.2%, in Preterm -39.5%, in LBW- 46.6%, in H/o preeclampsia – 40%, in H/o GDM – 16.6%. There was significant difference was found between mean Intravenous glucose level at 2,6,12 and 24 hours among the study participants. There was significant difference was found between no. of parity, prematurity and h/o GDM in mother and intravenous glucose level at 2, 6,12 and 24 hours of birth. Screening of at-risk newborn helps in the early detection of asymptomatic hypoglycemia which

will help in the prevention of adverse neurodevelopmental outcome. Routine screening helped to decrease morbidity and mortality due to hypoglycemia. The first 24 hours of life is a crucial part, at - risk babies are more prone to hypoglycemia hence routine screening is recommended in high-risk babies.

7. Source of Funding

None.

8. Conflict of Interest

None.

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