



Neonatal hypoglycaemia: Risk factors and clinical profile

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Abstract

Aim: To evaluate various maternal and fetal risk factors for neonatal hypoglycemia and its clinical presentation.

Introduction: Neonatal hypoglycemia is one of common metabolic problem specifically in the existence of risk factors for hypoglycemia. Symptoms of hypoglycaemia vary from lethargy, jitteriness, apnea, irritability, to seizures or may be absolutely asymptomatic. The hypoglycaemia with symptoms is usually associated with poor neurodevelopmental consequences.

Methods: This prospective study included 100 neonates born in Neonatal department of a tertiary hospital of Northern India, from 1st January 2017 to 31 December 2017. Detailed history about demographic characteristics of the mothers and their children was obtained. All the risk factors and clinical features were documented.

Results: Spectrum of clinical presentation included temperature instability 39%, jitteriness 34%, lethargy in 32%, cyanosis 12%, tachypnea 8%, apnoea 6% and seizures 9%. Maternal risk factors for neonatal hypoglycaemia noticed were maternal diabetic mellitus in 38%, eclampsia 22%, use of drugs like beta blockers (15%), oral hypoglycemic agents (08%), valproate (07%), by mother and family history of metabolic disorder (09%). (Table no.3). Neonatal risk factors were noticed as: hypothermia 22%, endocrine disorder 7%, inborn errors of metabolism 3%, inadequate feeding 32%, low birth weight 48%, small for gestational age 29%, respiratory distress 31% and sepsis 20%.

Conclusion: The common risk factors associated with neonatal hypoglycemia are low birth weight, small gestational age, respiratory distress, sepsis, hypothermia and inadequate feeding and maternal risk factors associated to neonatal hypoglycaemia were maternal diabetes, eclampsia, and maternal drug use.

Keywords: Hypoglycemia, neonates, low birth weight, maternal diabetes mellitus.

Introduction

Neonatal hypoglycemia is defined as blood glucose level below 47 mg/dl¹. Neonatal hypoglycemia is one of common metabolic problem specifically in the existence of risk factors for hypoglycemia. Neonatal hypoglycemia affects as many 5 to 15% of otherwise healthy babies and widespread in resource poor countries.^{2,3,4} The various risk factors for hypoglycemia are :maternal diabetes and obesity, LGA (birth weight >90th percentile for gestational age), SGA (birth weight <10th percentile for gestational age), low birth weight (>1800 to <2500 grams) and preterm (35-37 weeks). The fetus is totally dependent on maternal source and placental transference of glucose, free fatty acids, ketones amino acids, and glycerol for its energy requirement. The lower limit of glucose concentration is around 54 mg/dL in fetus during most of the time in gestation, especially after 20 weeks^{5,6}. At the time of birth, the newborn has blood glucose concentration of about 70% of the maternal level. It falls rapidly by 1 hour to as low as 20 to 25 mg/dl.⁷ This lower level of blood glucose is predominant in almost all healthy newborn. These levels are momentary and start to rise over the first few hours and days of life and this helps in establishing glucose homeostasis in post neonatal period and this whole process helps neonate in adaptation to extrauterine life^{8,9}. However, some newborn babies appear to have problem during transition to extrauterine life leading to low blood glucose level and altered homeostasis.

Symptoms of hypoglycaemia vary from lethargy, jitteriness, apnea, irritability, to seizures or may be absolutely asymptomatic. The hypoglycaemia with symptoms is usually associated with poor neurodevelopmental consequences, however the neurodevelopmental consequence of asymptomatic hypoglycemia is indeterminate.^{10,11} Treatment choices vary dependent on the newborn's birth weight and gestational age. In term Babies, initial management emphasizes on feeding and increased monitoring. If blood

glucose concentration remains low, admission to the neonatal intensive care unit for intravenous glucose is usually indicated. Breastfeeding is the preliminary management of asymptomatic hypoglycemia. Newborns on exclusive breastfeeding inclined to have lower blood glucose concentrations than newborns on formula feeding^{6,12,13}. Symptomatic hypoglycaemia need to be treated with parenteral glucose infusion. There are different protocols for treating asymptomatic hypoglycaemia. The incidence of hypoglycaemia differs according to the screening etiquettes and feeding approaches. We planned to evaluate various risk factors responsible for neonatal hypoglycaemia..

Material and Methods

This prospective study included 100 neonates born in Neonatal department of a tertiary hospital of Northern India, from 1st January 2017 to 31 December 2017 .All neonates with hypoglycaemia admitted into the unit during this study period were included. Detailed history about demographic characteristics of the mothers and their children was obtained. Past medical history and any morbidity during pregnancy particularly that of diabetes mellitus and hypertension, details about labour management and place and mode of delivery, any history of neonatal birth asphyxia was obtained. Detailed clinical examination was done. Rectal temperature and anthropometry were also recorded. Hypoglycemia, for this study was defined as plasma glucose level of 2.5 mmol/l. In all the neonates, whole blood sample was collected in a fluoride vial by aseptic technique and sent for laboratory examination by the glucose oxidase method and analyzed quickly to avoid erroneously low glucose levels. Screening was done at 1, 2, 6, 12, 18, 24, 48 and 72 hours of age, prior to feeding. Asymptomatic hypoglycaemia on a feed trial was tested after one hour of feed. In infants with hypoglycemia on glucose infusion, blood glucose was checked at hourly intervals till euglycemia is achieved and then 6 hourly. Tests was repeated 6 hourly during weaning from

infusion therapy. Screening was stopped if at the end of 72 hours, a high risk infant has not had hypoglycemia or an infant on total oral feeds has two consecutive values >50 mg/d. Babies with hypoglycemia were managed initially with a bolus of 10 percent intravenous Dextrose-in-water at 2 ml/kg. This was followed with 10 percent Dextrosein-water at a rate of 6 mg/kg/min (86 monitoring blood glucose levels. Data was analyzed on SPSS program version 16.0.

Results

A total of 100 neonates were included in the study out of 79 neonates were delivered in the hospital whereas 21 babies were presented in the outpatient department. Out of total 100 neonates, 45%, were less than 37 weeks of gestation,42% were between 38-41 weeks of gestation and about 9% were above 41 weeks of gestational age.52 were male and 48 were were females out of total 100 neonates. When we assess the neonates, low birth weight neonates were 28%, history of birth asphyxia 22%, neonatal sepsis in 8%, and delayed feeding was noticed in the 42% of the neonates. (Table no.1). Spectrum of clinical presentation included temperature instability 39%, jitteriness 34%, lethargy in 32%, cyanosis 12%, tachypnea 8%, apnoea 6% and seizures 9% (Table no.2) Maternal risk factors for neonatal hypoglycaemia noticed were maternal diabetic mellitus in 38%, eclampsia 22%, use of drugs like beta blockers (15%), oral hypoglycaemic agents (08%), valproate (07%), by mother and family history of metabolic disorder (09%). (Table no.3). Neonatal risk factors were noticed as: hypothermia 22%, endocrine disorder 7%, inborn errors of metabolism 3%,inadequate feeding 32%,low birth weight 48%, small for gestational age 29%, respiratory distress 31% and sepsis20% (Table no.4). The incidence of hypoglycemia in newborns with risk factors was 38.6%. In that, 31.3% newborns had asymptomatic hypoglycemia, 7.3% newborns had symptomatic hypoglycaemia.

Table no.1 Baseline features in neonates born with risk factors

	Frequency	%age
Receiving status		
From hospital	79	79%
Outdoor	21	21%
Gestation age (in weeks)		
<37 weeks	45	45%
38-41 weeks	42	42%
>41 weeks	13	13%
Gender		
Male	52	52%
Female	48	48%
Assessment		
Low birth weight	28	28%
Birth asphyxia	22	22%
Neonatal sepsis	08	8%
Delayed feeding	42	42%

Table No. 2: Spectrum of clinical features

Signs	Frequency	%age
Jitteriness	34	34%
Cyanosis	12	12%
Tachypnoea	08	08%
Apnoea	06	06%
Temperature Instability	39	39%
Seizures	09	09%
Lethargy	32	32%

Table No. 3 Frequency of maternal Risk factors

Risk factors	frequency	%age
Maternal diabetes	38	38%
Eclampsia	22	22%
Family history of metabolic disorder	09	09%
Maternal drug use		
Beta blocker	15	15%
Oral hypoglycemic drugs	08	08%
Valproate	07	07%

Table no.4 Neonatal Risk Factor

Neonatal risk factors	frequency	%age
Small for gestational age	29	29%
Low birth weight	48	48%
Respiratory distress	31	31%
Sepsis	20	20%
Hypothermia	22	22%
Endocrine disorder	07	7%
Inborn errors of metabolism	03	3%
Inadequate feeding	32	32%

Discussion

Hypoglycemia is a very common metabolic problem occurring in neonates. In lots of cases, it simply reflects a usual process of adaptation to extra uterine life. The term“ hypoglycemia” refers to a decrease in the plasmagluose level. In the

present study, 79 neonates were delivered in the hospital whereas 21 babies were presented in the outpatient department. 52 were male and 48 were females out of total 100 neonates. In the study of C.D. Dhananjaya et al. he found majority of the males¹⁴. Out of 100 neonates, 45% were less than 37 weeks of gestation, 42% were between 38-41 weeks of gestation and about 9% were above 41 weeks of gestational age. In a study by Dedeke et al, the gestational age of neonates with hypoglycaemia extended between 26 to 44 weeks and hypoglycemia was suggestively most common in preterm babies than term and postterm babies¹⁵. On the assessment of the cases, low birth weight neonates were 28%, history of birth asphyxia 22%, neonatal sepsis in 8%, and delayed feeding was noticed in the 42% of the neonates. These results were comparable compare with a study¹⁶ done by Munir akmal. In the present study, spectrum of clinical presentation included temperature instability 39%, jitteriness 34%, lethargy in 32%, cyanosis 12%, tachypnea 8%, apnoea 6% and seizures 9%. In the study conducted by C.D. Dhananjaya et al., the common clinical features were lethargy 81.25%, and jitteriness 75%, respiratory abnormalities 37.5%, cyanosis 18.75% and seizures 31.25%¹⁴. Similar spectrum of clinical features was also noted by the study conducted by of P.K. singhal et al¹⁷. Maternal risk factors for neonatal hypoglycemia in this study maternal diabetic mellitus in 38%, eclampsia 22%, use of drugs like beta blockers (15%), oral hypoglycemic agents (08%), valproate (07%), by mother and family history of metabolic disorder (09%). The study done by Dorina Rodica Burdan et al, noticed rupture of the membrane and urinary tract infections as common maternal risk factors for neonatal hypoglycemia¹⁸. According to a study by Cornblath M et al, common maternal risk factor for neonatal hypoglycemia is arterial hypertension¹⁹, which is similar to our study showing eclampsia as one of the common maternal risk factor for neonatal hypoglycaemia. Neonatal risk factors of the patients found in our study were hypothermia 22%, endocrine disorder

7%, inborn errors of metabolism 3%, inadequate feeding 32%, low birth weight 48%, small for gestational age 29%, respiratory distress 31% and sepsis 20%. In the study by Dorina Rodica Burdan et al, noticed risk factors for neonatal hypoglycemia as perinatal hypoxia (40.31%), hypothermia (31.45%), respiratory distress (40.31%), sepsis (12.09%), neonatal shock (9.67%) and polycytemia (8.87%)¹⁸.

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