



## Original Article

# Clinical Profile and Status of Blood Glucose in Asphyxiated Newborns

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### Abstract

Perinatal asphyxia will be defined as 1-minute apgar-score of 6 or less. Fifty cases and fifty control was observed in this study. The main clinical presentation were convulsion, respiratory distress, apnea, excess crying etc. From all babies blood glucose was done by colorimetric methods. In asphyxiated newborns mean ( $\pm$  SEM) serum glucose level was 75.26 mg/dl which was significantly lower than the mean serum glucose level of control ( $\pm$  SEM) 77.64 mg/dl. Hypoglycaemia asphyxiated newborn were 42%. In convulsive infants 60% were associated with hypoglycaemia. So, the study shows that hypoglycaemia occurs frequently in asphyxiated newborns and earlier appropriate treatment can reduce morbidity and mortality significantly.

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### Introduction

Perinatal asphyxia is an insult to the fetus or newborn due to lack of oxygen (Hypoxia) and/or lack of perfusion (ischaemia) to various organ<sup>1</sup>. Essential characteristics of perinatal asphyxia should be present are (i) Profound metabolic or mixed acidemia ( $p^H < 7.0$ )<sup>2</sup> ii) Persistence of an-Apgar score of (0-3 for >5 min) iii) Neurologic manifestation in the immediate neonatal period include seizure, hypotonia, coma, hypoxic ischemic encephalopathy (HIE) and iv) Evidence of multi-organsystem dysfunction<sup>2</sup>. When the asphyxial insult is manifested by abnormal neonatal neuronal behaviour the syndrome is called hypoxic ischemic encephalopathy (HIE)<sup>3</sup>. The incidence of, perinatal asphyxia is about 1.0 to 1.5% in most-centre and is usually related to gestational age and birth weight. It occurs in 9.0% of infant less than 36 weeks of gestational age<sup>4</sup>. Seven million perinatal deaths occur each year mostly in developing countries<sup>4</sup>.

A variety of metabolic disturbances are present in asphyxiated neonate including hypoglycaemia, hyponatraemia, hypocalcaemia and hypomagnesaemia<sup>8</sup>. Hypoglycaemia is one of the most common metabolic problem in neonates, manifested as apnea, hypotonia, inadequate sucking reflex, irritability, Irregular respiration, poor sucking or feeding, exaggerated moro reflex, cyanosis, tremors, pallor, eye rolling, seizure, lethargy, changes in consciousness, temperature instability and coma<sup>2</sup>. The incidence of hypoglycaemia in neonate varies from 0.2 to 11.4%<sup>10</sup>. Approximately two third of babies had one or more risk factors including birth asphyxia (24.2%), diabetic mother (23.8%), respiratory distress (13.9%) and septicaemia (11.6%)<sup>10</sup>. Infant with perinatal asphyxia have increased risk of hypoglycaemia due to glycogen depletion secondary to catecholamine release and to an unexplained hyperinsulinemic state often seen in, asphyxiated infants. Therefore close blood glucose

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monitoring of asphyxial newborn is necessary for proper management. Similar clinical manifestations of hypoglycaemia and HIE often make it difficult to differentiate clinically an asphyxiated newborn. Therefore for the management of these babies monitoring of blood glucose level is important. There is little information on this issue in the available document though perinatal asphyxia is a leading cause of neonatal morbidity and mortality and hypoglycaemia may potentiate the brain dysfunction and motor developmental retardation. Therefore this study will be carried out to determine the status of blood glucose in Asphyxiated newborns.

### Aims and objectives:

1. To study the clinical profile of asphyxiated newborns.
2. To estimate the blood glucose level in perinatal asphyxiated newborns.
3. To determine the prevalence of hypoglycaemia in perinatal asphyxiated newborns.

### Material and Methods

**Type of study:** Hospital based prospective and cross sectional study.

**Place of study:** Paediatrics Department of Kushtia General Hospital, Kushtia. This is a tertiary referral hospital in Kushtia city. Patients are referred from surrounding districts, clinics of Kushtia City and Gynaecology and Obstetric Department of the same hospital.

**Duration study:** From December 2009 to July 2010.

**Sample size:** 50 Admitted cases of asphyxiated newborns and equal number of control subjects.

**Inclusion criteria:** Full term newborns admitted with perinatal asphyxia diagnosed on the basis of, apgar scoring, system. Asphyxiated newborns having apgar score 6-0 at I minute were selected as case and 50 control were selected having apgar score 7 or more.

**Exclusion criteria:** Preterm infants, infants of diabetic mothers and small for date were excluded.

**Methodology:** All the patients were examined within 8 hours of admission. Before, examination informed consent was taken from the attendant and the nature of the investigation was explained. The gestational age of all neonates were determined by maternal menstrual history and physical examination of the newborn.

After selection of the patients, all the clinical findings and investigations were recorded on a pre-designed questionnaire.

Blood glucose was done by colorimetric methods. Two samples were collected. 1<sup>st</sup> sample on admission before starting I/V nutrition and any medication and 2<sup>nd</sup> sample after 12 hours. Other relevant investigations were done according to the advice of the consultant and patient was managed accordingly. Each patient was followed up till discharge.

**Statistical methods:** Results were expressed as mean  $\pm$  SEM. Statistical analysis were performed by unpaired student's 't' test. P value  $<$  0.05 was considered as significant.

### Results

The present study included 50 cases and 50 control subjects

**Table 1.** Distribution of sex among case and control

Group	Male No. (%)	Female No. (%)	Total No. (%)
Control	27(54%)	23(46%)	50(100%)
Case	27(54%)	23(46%)	50(100%)

**Table-1** shows distribution of male and female subjects. Out of 50 patients, 27 (54%) were male and 23(46%) were female and equal number of both male and female were taken as control.

**Table 2.** Mean value of serum glucose in case and control

Group	Serum Glucose (mg/dl) (Mean $\pm$ SEM)
Control (n=50)	77.64 $\pm$ 4.55
Case (n=50)	57.26 $\pm$ 4.64
P value*	$<$ 0.01

\*Unpaired Student's 't' test (highly significant)

**Table-2:** Shows mean serum glucose level. In asphyxiated infant mean serum glucose value is  $57.26 \pm 4.64$ mg/dl which is significantly lower than the control value  $77.64 \pm 4.55$  mg/dl.

**Table 3:** Percentage of hypoglycaemia in perinatal asphxia

Group	Hypoglycaemia No. (%)
Control (=50)	4(8.0%)
Case (n=50)	21(42%)

**Table-3.** Shows percentage of hypoglycaemia. Out of 50 cases 21 cases (42%) were hypoglycaemic compared with 4(8%) were hypoglycaemic in control.

**Table 4.** Causes of convulsion in perinatal asphyxia (n=20)

Causes	No. Patients	Percentage
Hypoglycaemia	12	60
Other causes	8	40

**Table-4.** Shows distribution of causes of convulsion perinatal asphyxia 20 patients presented with convulsion and out of them 12 (60%) were hypoglycaemic.

**Table 5.** Mortality rate

Group	Number of patients	Percentage
Control (n=50)	0	0
Case (n=50)	11	22%

**Table-5.** Shows distribution of mortality. During treatment 11(22%) patients died, and all of them were severely asphyxiated (Apgar score < 3 at one min).

**Table 6.** Mortality rate in hypoglycaemia (n=11)

Cause of mortality	Number of patients	Percentage
hypoglycaemia	11	100

**Table-6.** Shows mortality due to hypoglycaemia. All infants who died, had hypoglycaemia.

## Discussion

Perinatal asphyxia is the second most common cause of neonatal death (26%). In our country perinatal mortality varies from 75 to 151.1 per thousand births in different studies. One study

performed in Bangabandhu Sheikh Mujib Medical University (BSMMU) shows the leading cause of neonatal deaths as LBW (15,2%) and perinatal asphyxia (12.9%). A retrospective study of 788 neonates admitted in the Neonatal unit of Dhaka Shishu Hospital during July 1981 to June 1982 had shown that 102 babies were asphyxiated at birth (12.92%) and among the asphyxiated babies 32.35% died during the neonatal period. In this study main clinical presentations were convulsion (40%), respiratory distress (26%), apnoea (18%), excess crying (10%), jitteriness (6%) and some infants had more than one clinical presentation. Convulsion may be either due to direct effect of asphyxia or secondary to hypoglycaemia, hypocalcaemia or intracranial haemorrhage<sup>3</sup>. A variety of metabolic disturbances are present in asphyxiated neonates including hypoglycaemia, hyponatraemia, hypocalcaemia and hypomagnesaemia. Some of this biochemical disturbances may potentiate the development of seizure and cause further brain damage. About 50% of neonatal convulsion are associated with perinatal asphyxia<sup>9</sup>.

Perinatal asphyxia is the recognized cause of hypoglycaemia which is evident from different studies<sup>10,11,12,13</sup>. Sigal et al showed that approximately two-third of the hypoglycaemic babies (67.3%) had one or more risk factors including birth asphyxia (24.2%). In this study, mean value of serum glucose of perinatal asphyxiated babies was 57.26 mg/dl which much lower than the mean value of controls 77.64 mg/dl. Carnblath et al<sup>12</sup> showed mean normal value of newborns as 60.0mg/dl which is in approximate with our control value.

Seizures have been reported in 30 to 69 percent of infants with abnormal neurologic examination after an intrauterine asphyxial episode<sup>14</sup>. Brown et al<sup>15</sup>. showed that 38 percent of convulsion occurred during the first three days in asphyxiated infants. Eriksson and Zetterstrom described 37 infants of asphyxia with convulsion of which 12 had hypoglycaemia. Kumar et al<sup>8</sup>. described 16 cases of birth asphyxia with seizure, in which three had hypoglycaemia and one had

hypocalcaemia and another's had intracranial haemorrhage. In this study 20 infants presented with convulsion. Of which 12(60%) were hypoglycaemic that is 60% of convulsive babies had hypoglycaemia.

Mortality rate among perinatal asphyxia also varies in different studies from 21-42.8%<sup>7,16,17</sup>. In this study mortality rate was 22% which was similar to Banu et al., who showed mortality rate in perinatal asphyxia at Dhaka Shishu Hospital as 32.35%. In the present study all of 11 (1000%) who died were hypoglycaemic. The other significant predictors of mortality were LBW hypothermia and neonatal seizure. In our study all the infants were full term and there was no preterm.

### Conclusion

Asphyxiate newborns frequently present with convulsion, respiratory distress and others menifestration. But this study shows that low blood glucose level occurred frequently in asphyxiate newborns. Early treatment of the asphyxia may prevent hypoglycaemia and appropriate correction of hypoglycaemia reduce morbidity and mortality. Therefore it is necessary to monitor serum glucose level in asphyxiated newborns as a regular basis.

### References

1. Snyder EY, Cloherty JP. perinatal asphyxia. In : cloherty JP, stark AR, editors. Manual of Neonatal care. 3rd cd. Boston : Little, Brown and Company, 1991;393.
2. Gomella TL, Cunningham MD, et at; Neonatology: Management, Procedures, On-call problems, Diseases and Drugs. 5th ed New York: McGraw-Hill companies, 2004;262-66, 512-21.
3. Merchant RH. Birth asphyxia: Predictors of outcome and management Indian J Pediatr 1955; 52:609-14.
4. Del Costello AM, Manandhar DS. Perinatal asphyxia in less developed countries. Arch Dis Child 1994; 71: F-1-F-3.
5. Ban 1, Siddiquey AHM, Rahman MS, Hossain MA. Perinatal mortality in a teaching hospital TAJ (Rajshahi) 1996 9; 95-7.
6. Islam MN, Sharma Ti), Daisy S, Tabib SMSB, Mostakim MA., Sarkar CB. Causes of mortality in the paediatric unit of the Institute of Post graduate Medicine and Research, Dhaka. Dhaka Shishu Hosp J 1994; 10:61-6.
7. Banu K, Hossain MM, Asphyxic neonatorum at Dhaka Shishu Hospital special care baby unit: a study of 102 cases, Dhaka Shishu Hospital 1983; 1: 5-9.
8. Kumar A, Gupta V, Kachhawaha JS, Single PN. Biochemical abnormalities in Neonatal seizures. Indian Pediatr 1995; 32:424-8.
9. Enksson M, Zetterstrom R. Neonatal convulsions: incidence and causes in the Stockholm area. Acta Pediatr Scand 1979; 68: 807-11.
10. Siughal RK, Singh M, Paul VK, Deiorari AK, Gharpade MG, Malhotra A. Neonatal hypoglycaemia: clinical profile and glucose requirements. Indian pediatr 1992 ; 29: 167-71.
11. Lucas A, Morely R, Cole TJ. Adverse neurodevelopment outcome of moderate neonatal hypoglycaemia. Br Med J 1988;63:1353-8.
12. Carnablath M, Joassin G, Weisskopf B, Swiatek KR. Hypoglycaemia in the newborn. Pediatr Clin N Am 1966;13:905-11.
13. Fluge G. Clinical aspect of neonatal hypoglycaemia. Acta Pediatr Scared 1974;63:826-32.
14. Alfred W, Bram Jr. Hypoxic ischemic encephalopathy (asphyxia). Pediatr Clin N Am 1980, 33: 451-63.
15. Brown JK, Cockburn F, Forfar JO. Clinical and chemical correlates in convulsion of newborn. Lancet 1972;1:135-8.
16. Jayakumar V, Kaliaperumal K, Lakashmikanthan R, Viswanathan J. Birth asphyxia: its relationship to cerebral palsy. Indian Pediatr 1979; 16:777-9.
17. MacDonald HM, Mulligan JC, Allen AC, Taylor PM. Neonatal asphyxia I. Relationship of obstetric and neonatal complication to neonatal mortality in 38,405 consecutive deliveries. J Pediatr 1980; 96:898-902

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