

# Clinical Presentation of Preterm Neonates with Intraventricular Hemorrhage: Experience in a Tertiary Care Hospital in Dhaka

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## Abstract

**Background:** Intraventricular hemorrhage (IVH) is common among preterm infants as many of them survive with the advancements in neonatal care. Severe IVH may lead to significant morbidity and mortality. The objective of our study is to find out the significant clinical signs of IVH in preterm neonate for early detection by ultrasonography.

**Methods:** This prospective observational study was done in special care baby unit (SCABU), Bangladesh Institute of Research & rehabilitation of Diabetic, Endocrine & metabolic Disorder (BIRDEM) for a period of one year. Eighty five preterm neonates were included in this study. Clinical features of IVH like- convulsion, lethargy, irritability, bulged fontanelle, recurrent apnea, sudden onset of respiratory distress, sudden pallor and bradycardia were observed. Cranial ultrasound studies were done within 7 days of life in all cases to identify IVH.

**Result:** Mean gestational age of these neonates was 31.31(±2.2) weeks & mean birth weight was 1413.42 (±330.55) gm. Among 85 preterm neonates 21(24.7%) developed IVH, confirmed by ultrasonography of brain. Clinical features like convulsion, bulged fontanel, repeated apnea & sudden pallor were significantly present in IVH group.

**Conclusion:** Intraventricular Hemorrhage constitutes an important cause of morbidity and mortality in neonate. This study showed that clinical features like convulsion, bulged fontanel and sudden pallor had a significant relationship with intraventricular hemorrhage which will help for its early detection.

**Key words:** Preterm infant, Intraventricular Hemorrhage.

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## Introduction

Intraventricular hemorrhage (IVH) is a leading cause of morbidity and mortality in the preterm neonates. The most important morbidity is neurological and

includes cognitive and motor disabilities. Depending upon the severity of the hemorrhage, neurological and neurodevelopmental abnormalities of preterm neonates ranges from 5% to 40%.<sup>1</sup>

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In a prematurely born infant the hemorrhage occur in the germinal matrix, located at the subependymal region of cerebral hemisphere. The germinal matrix gives origin to the cerebral neuroblasts and glia; it is highly cellular, gelatinous and vascularized by capillaries but are poorly supported by muscle or collagen. This fragile structure is prone to hemorrhage following abrupt changes in cerebral blood flow. In the premature neonate, such changes are often related to perinatal asphyxia and respiratory distress syndrome.

Although twenty-five percent of neonate with IVH may remain asymptomatic, but some early clinical signs consistent with IVH are apnea, cyanosis, refusal to suck,

gradual deterioration in neurological status like alteration of level of consciousness and abnormalities of movement, tone, respiration and eye position/movement.<sup>2,3</sup> Some signs often confused with other complications of premature baby.

Real time ultrasound (RTU) is highly sensitive (96%) and specific (94%) non-invasive procedure in diagnosing intracranial hemorrhage [ICH].<sup>4</sup> Early detection of IVH by clinical features and then confirmed by cranial ultrasound will help to take further measures to reduce morbidity and mortality.

The objective of our study is to find out the clinical signs consistent with IVH in preterm neonate.

### Methods

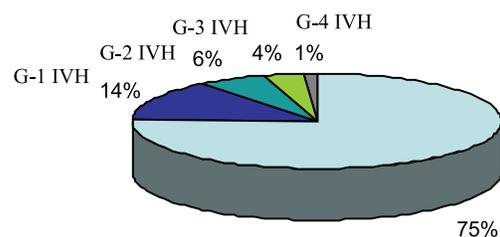
A prospective study was done in special care baby unit (SCABU), BIRDEM from May 2013 to April 2014. Eighty five preterm neonates with gestational age from 28 weeks to 36 weeks and birth weight from 800 gm to 2000 gm and clinical features suggestive of IVH were included in this study. Neonates with perinatal asphyxia and major congenital anomalies were excluded. Clinical information such as antenatal history, maternal disease, place of delivery, type of delivery, resuscitative measures taken were recorded in data collection sheet. Gestational age was assessed depending upon the maternal last menstrual period, first antenatal ultrasound study and by new modified Ballard scoring system.<sup>5</sup> Birth weights were measured on an electronic digital scale to the nearest 5 gm division. Clinical features consistent with IVH like convulsion, lethargy, irritability, bulged fontanel, recurrent apnea and sudden onset of respiratory distress in a previously well neonate, sudden pallor and bradycardia were observed and recorded. Cranial ultrasound studies were done within 7 days of life in all cases to identify IVH. This procedure was performed

through anterior fontanelle by using a portable real time scanner fitted with a 6.5 MHz curvilinear transducer of Logic á 100 ultrasonography machine in the coronal and sagittal planes. IVH was graded according to the most widely used classification system described by Papile and associates. IVH was graded from 1 to 4 with increasing severity and its extension.<sup>5,6</sup>

In our study group the neonates who developed IVH were categorized as Group-I and those who did not have IVH were categorized as Group- II. Collected data was analyzed by using Statistical Package for Social Science (SPSS version 22.0) software package.

### Results

The study was done in 85 preterm neonates. Baseline characteristics are shown in Table I. Mean gestational age was 31.31( $\pm$ 2.2) weeks & mean birth weight was 1413.42 ( $\pm$ 330.55) gm. Among them 68% baby were delivered at BIRDEM general hospital and 71% neonate were born by caesarean section. USG of brain was done in all neonates. Ultrasonographic finding were normal in 64 (75.2%) neonates and IVH of different grade were found in 21(24.7%) neonate. Among these 21 neonates who developed IVH; Grade 1 IVH was found in 14 % babies and grade 2 in 6 % babies. Only 4% neonates had grade 3 and 1% had grade 4 IVH. (Figure 1).



**Figure 1.** USG findings of newborn (n=85)

**Table I.** Baseline data of the study group (N=85)

Mean gestational age	31.31 (2.2) weeks
Mean birth weight	1413.42(330.55)gm
Male : Female	1:2.1
Place of delivery:	
1. Delivered at BIRDEM General Hospital	80
2. Delivered outside BIRDEM General Hospital	40
Mode of delivery:	
1. Normal vaginal delivery	17
2. Caesarean section	83

We observed the clinical features of these neonates and compared these features between the patients with IVH and patients without IVH (Table- II). Features like

convulsion, bulged fontanel, repeated apnea and sudden pallor were significantly more in group- I than group –II ( $p < 0.05$ ).

**Table II.** Comparisons of clinical features in Group-I and Group-II ((N=85)

Clinical Features	Group-I (n- 21)	Group-II (n- 64)	P value
	Frequency (percentage)	Frequency (percentage)	
Convulsion	07 (33.3%)	02 (3.1%)	0.002
Irritability	10 (47.6%)	08 (12.5%)	0.02
Lethargy	07 (33.3%)	10 (15.6%)	0.16
Bulged Fontanel	08 (38%)	01 (1.5%)	0.00
Repeated apnea	17(80.9%)	17 (26.5%)	0.01
Respiratory distress	17 (80.9%)	24 (37.5%)	0.04
Sudden pallor	07(33.3%)	03 (4.6%)	0.006
Bradycardia	3(14.2%)	02 (3.1%)	0.11

### Discussion

In this study the mean birth weight of the study group was 1413.42 ( $\pm 330.55$ ) gm and the mean gestational age determined by Ballard scoring system was 31.31 ( $\pm 2.2$ ) weeks. This is similar to the findings by a study conducted by Kadri H et al indicating that preterm and very low birth weight infants have an increased risk for the incidence of IVH.<sup>7</sup>

Cranial ultrasound was done in all neonates in this study group within seven days of age. Among them 24.7% babies had intraventricular hemorrhage. Other studies showed that incidence of IVH varies from 24% to 45% in preterm neonates.<sup>7-10</sup> Here majority of them had grade I and grade II IVH, 4% babies developed grade III IVH and 1% babies had grade IV IVH (Figure-1). Kadri H et al found 44.6% of preterm neonate with grade I and grade II IVH, which was consistent with this study.<sup>7</sup> But Strober JB et al found 31% babies with grade IV IVH in a study population of average 29 weeks of gestation.<sup>8</sup>

The clinical findings observed were convulsion, irritability, lethargy, high pitched cerebral cry, bulged fontanelle, sudden pallor, recurrent apnea, respiratory distress and bradycardia. Among these features convulsion, bulged fontanelle, repeated apnea, sudden pallor were significantly common in neonate with IVH in this study. Some studies also reported that convulsion was the commonest symptoms of IVH and markedly

present in patients with Grade III and Grade IV IVH.<sup>7,8,9</sup>

In this study, preterm neonates with IVH were frequently present with repeated apnea, which was similar to the study done by Kadri H et al<sup>7</sup> and Richard D et al.<sup>10</sup>

Bulged fontanelle was also a significant sign of intraventricular hemorrhage. In this study it was found in 38% of preterm neonate with intraventricular hemorrhage which was statistically significant. Levene M et al in his study showed about 52% of premature neonate had bulged fontanel as a consequence of IVH which was similar to Alen Hill.<sup>11,12</sup>

Sudden pallor was a significant early sign of IVH which can be detected by low hematocrit level and it was consistent with some studies but different from others.<sup>13-15</sup>

Although Rasul CH et al reported lethargy as a common symptom of IVH but lethargy, respiratory distress, bradycardia were not significantly present in this study group.<sup>15</sup> Reynolds PR et al found 60% of neonate presented with respiratory distress in relation to IVH.<sup>16</sup> Some studies reported that preterm babies developed sudden bradycardia during the occurrence of hemorrhage,<sup>17,18</sup> which was not observed in this study.

If a large number of preterm neonates are observed for an extensive period, then it will be easy to establish some other features associated with IVH.

### Conclusion

This study showed that clinical features like convulsion, bulged fontanel and sudden pallor had a significant relationship with intraventricular hemorrhage. Early detection of IVH by its clinical features will help for further evaluation and management to reduce the mortality and long term morbidity of preterm neonate.

**Conflict of interest:** None

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