



ORIGINAL ARTICLE

Frequency of intracranial hemorrhage (ICH) in term neonates delivered with fetal distress.

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ABSTRACT... Objective: To determine the frequency of intracranial hemorrhage (ICH) in term neonates delivered with fetal distress. **Study Design:** Descriptive, Cross-sectional study. **Setting:** Neonatal Intensive Care Unit (NICU) attached with Department of Obstetrics & Gynecology, Sir Sadiq Abbasi Hospital, Bahawalpur, Pakistan. **Period:** August 2021 to February 2022. **Material & Methods:** A total of 300 term neonates with fetal distress were included. All the neonates who had pallor and or bulging anterior fontanelle were investigated with the help of CT scan brain (plain) and presence or absence of ICH was noted. **Results:** In a total of 300 neonates, 172 (57.3%) were male. The mean gestational age was 38.42 ± 1.53 weeks. The mean birth weight was 3.12 ± 0.89 kg. Asphyxia neonatorum was noted in 94 (31.3%) neonates. Birth trauma was reported among 98 (32.7%) neonates. The frequency of ICH in term neonates delivered with fetal distress was noted in 73 (24.3%) neonates. **Conclusion:** The frequency of intracranial hemorrhage in term neonates delivered with fetal distress is quite high.

Key words: Fetal Distress, Intracranial Hemorrhage, Neonate.

INTRODUCTION

Acute bleeding occurring into skullcap or calvaria due to some pathology is termed as intracranial hemorrhage (ICH).¹ Among newborn babies having nonreassuring fetal status, the frequency of ICH has been recorded as 26%² while literature reports ICH associated mortality ranging between 0.5% to 22.4%.^{3,4} Delay in the achievements of normal developmental milestones, hydrocephalus and cerebral palsy are the long-term outcomes of ICH.⁴

As far as intracranial hemorrhage is concerned, the instrumental deliveries and the infants being delivered through cesarean section are likely to have higher rate than normally delivered infants but the neonates delivered through cesarean section before the start of labor have low rates which indicates that abnormal labor is frequently occurring risk factor for intracranial hemorrhage.⁵ Most of the time IVH is initiated from the

choroid plexus or it is the extension of thalamic hemorrhage.⁶

Apart from the risk factors which are associated to neonates, maternal risk factors like use of certain medicine, pregnancy induced hypertension, abrupt removal of placenta, autoimmune diseases or platelet autoimmunization might be contributing factors for intracranial hemorrhages.⁶ Thrombocytopenia, clotting abnormalities, and increase in the cerebral venous pressure are the congenital factors which may cause bleeding in neonates.⁷ The most frequently observed congenital factor which places neonates at higher risk of intracranial bleeding is thrombocytopenia, but hereditary factors, immunological factors, drug related or contagious factors may trigger its development. In numerous cases unidentified etiology of hemorrhage is observed.⁶ Spontaneous vaginal delivery is common mode of delivery in up to 75% of neonates with ICH.^{7,8}

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Prematurity, very low birth weight and assisted vaginal delivery are common risk factors for development of ICH.² Researchers have shown that ICH in neonates is relatively less common in full term neonates when compared to preterm ones.⁹ According to Looney et al hypothesis, antenatal stress was the contributing factor for the injury of brain and ICH in newborn babies, while in preterm infants they are associated with anatomical and functional immaturity in cerebral blood vessels.⁷ CT scanning is more sensitive than ultrasonography. Treatment includes is mainly supportive.^{9,10}

In few studies, it has been found that fetal distress is a risk factor for ICH in term neonates^{2,7,9,11}, but no study has been done to find out the frequency of ICH in term neonates delivered with fetal distress. In the southern Punjab the health facilities are poor and antenatal monitoring is not so good, the chances of fetal distress are more and ultimately more chances of ICH. This study was thought to be helpful in finding out the frequency of ICH in term neonates delivered with fetal distress so that importance of perinatal monitoring can be highlighted to decrease the chances of ICH. This study was done to determine the frequency of ICH in term neonates delivered with fetal distress at a tertiary care hospital of southern Punjab.

MATERIAL & METHODS

This descriptive, cross-sectional study was conducted at Neonatal Intensive Care Unit (NICU) attached with department of Obstetrics & Gynecology, Sir Sadiq Abbasi Hospital, Bahawalpur, Pakistan from August 2021 to February 2022. A sample size of 300 neonates was calculated considering percentage of ICH as 26% as studied by Looney et al² with margin of error 5% and confidence level 95%. Non-probability, consecutive sampling was adopted. Inclusion criteria were term neonates of both gender, irrespective of birth-weight and delivered with fetal distress. Exclusion criteria were neonates having congenital heart defects or those with bleeding diatheses (detected by family history of bleeding disorder or evidence of bleeding from any site or petichae and bruises on physical examination). Approval from Institutional Ethical

Committee was acquired (letter no. 1776, dated: 21-06-2022). Informed and written consents were sought from parents/caregivers.

The ICH was labeled as any child who had pallor and bulging anterior fontanelle on clinical examination and had hyper dense area seen on CT scan brain (plain), reported by a radiologist. Fetal distress was labeled as any neonate who was delivered with abnormal cardiotocography or passage of meconium before delivery. Both were documented by the clinical record provided by the Obstetrics & Gynecology department. Birth trauma was named when there was an external evidence of neonatal birth trauma in the form of scalp swelling or bruising (bluish discoloration). Asphyxia neonatorum was defined as any child who does not cry or cries poorly. It was assessed on history and clinical record. Neonates who were delivered between 37 and 42 completed weeks of gestation were labeled as termed. Normal birth weight was defined as ≥ 2.5 -4 kg and low birth weight < 2.5 kg. Informed as well as written consent was sought from parents/caregivers of all neonates. All the neonates who had pallor and or bulging anterior fontanelle were investigated with the help of CT scan brain (plain) and presence or absence of ICH was labeled according to operational definition. All the study information was collected and recorded on a predefined proforma.

All the collected data was analyzed through "(SPSS)", version 26.0. Quantitative variables like age and weight of the baby were presented as mean and standard deviation. Qualitative variables like gender, place of delivery, mode of delivery, low birth weight (LBW), asphyxia neonatorum, birth trauma and ICH were presented as frequency and percentages. Effect modifier like age, gender, place of delivery, mode of delivery, LBW, asphyxia neonatorum and birth trauma were controlled through stratification. Post stratification chi-square was applied taking p-value ≤ 0.05 as significant.

RESULTS

Out of 300 neonates, 172 (57.3%) were males and 128 (42.7%) females with male to female ratio of

1.3:1. The mean gestational age was 38.42 ± 1.53 weeks ranging from 37-42 weeks. The mean birth weight was 2.82 ± 0.39 kg. Asphyxia neonatorum was noted in 94 (31.3%) neonates. Birth trauma was reported among 98 (32.7%) neonates. Table-I is showing characteristics of all the neonates studied.

Characteristics		Number (%)
Gender	Male	172 (57.3%)
	Female	128 (42.7%)
Gestational age (weeks)	37-39	234 (78.0%)
	40-42	66 (22.0%)
Delivery place	Home	115 (38.3%)
	Hospital	185 (61.7%)
Mode of delivery	Spontaneous vaginal delivery	107 (35.7%)
	Cesarean section	128 (42.7%)
	Assisted delivery	65 (21.7%)
Low birth weight		84 (28.0%)
Asphyxia neonatorum		94 (31.3%)
Birth trauma		98 (32.7%)

Table-I. Characteristics of neonates (n=300)

The frequency of ICH in term neonates delivered with fetal distress was noted in 73 (24.3%) neonates. Stratification of intracranial hemorrhage with respect to gender, gestational age, place of delivery, mode of delivery, low birth weight, asphyxia neonatorum and birth trauma is shown in Table-II.

DISCUSSION

Intracranial hemorrhage (ICH) in neonates is classified into five main categories:¹² i) subdural

hemorrhage (SDH), ii) primary subarachnoid hemorrhage (SAH), iii) cerebellar hemorrhage (CH), iv) Intraventricular hemorrhage (IVH) and v) intraparenchymal hemorrhage (IPH). Among neonates, the incidence of SDH and IPH is more frequent, whereas among neonates with premature birth, the occurrence of SAH, IVH and CH is found to be more frequent.¹³ For the past few years, the frequent use of brain imaging techniques in newly born babies showing no clinical symptoms has enabled us to recognize SDH on regular basis.¹³ Normally, no signs or symptoms specific to neurology are observed among term infants presenting with ICH. Generally occurring signs can be observed which may not be direct indicators of the brain disease.¹⁴

The motive of this study was to find out the frequency of ICH in term neonates delivered with fetal distress and the frequency of ICH was noted to be 24.3% among neonates with fetal distress. Among newborn babies, ICH is a potential risk factor to cause morbidity or mortality. Considering term neonates, insufficient data is available to evaluate ICH among newborns with fetal distress. All of the five types of symptomatic ICH have 0.27–0.49 incidence for every 1000 live-births.¹⁵ During labor, the introduction of mechanical procedures to the term neonates may lead towards ICH, while among preterm newborns, the immature CNS and their unstable hemodynamics are the causative factors for ICH.¹⁶

Characteristics		Intracranial Hemorrhage		P-Value
		Yes (n=73)	No (n=227)	
Gender	Male	40 (54.8%)	132 (58.1%)	0.614
	Female	33 (45.2%)	95 (41.9%)	
Gestational age (weeks)	37-39	57 (78.1%)	177 (78.0%)	0.984
	40-42	16 (21.9%)	50 (22.0%)	
Delivery place	Home	29 (39.7%)	86 (37.9%)	0.778
	Hospital	44 (60.3%)	141 (62.1%)	
Mode of delivery	Spontaneous vaginal delivery	32 (43.8%)	75 (33.0%)	0.236
	Cesarean section	28 (38.4%)	100 (44.1%)	
	Assisted delivery	23 (31.5%)	52 (22.9%)	
Low birth weight		21 (28.8%)	63 (27.8%)	0.867
Asphyxia neonatorum		26 (35.6%)	68 (30.0%)	0.364
Birth trauma		24 (32.9%)	74 (32.6%)	0.965

Table-II. Stratification of intracranial hemorrhage with respect to characteristics of neonates (N=300)

Between full-term and preterm neonates, not only the etiology is different but the hemorrhage location, presentation in the clinic, and neural outcome, are also different. The signs associated with IVH term babies are seizures, apnea, irritable behavior or laziness, and vomiting along with dehydration.¹⁷⁻¹⁹ About 25% of the ICH cases show no symptoms and imaging techniques are the only way to detect them. Cranial ultrasonography has significantly advanced in its all aspects to detect intracranial lesions among term babies.¹⁶⁻¹⁹

Although, we did not find any significant linkage between mode of delivery and frequency of ICH in this study but interesting findings have been reported by some other researchers. Towner et al²⁰ reported a finding of great importance that potential risk factors associated to ICH were implication of forceps, vacuum extraction, and cesarean section. Benedetti²¹ described that in case of failure of attempted vaginal delivery, there were more chances of trauma, irrespective of the delivery method. The finding of Whitby et al¹³ revealed that failure of vacuum delivery followed by successful forceps delivery placed the neonates at higher risk of SDH than those babies who were delivered through some other mode of delivery. Therefore complexity in the labor becomes the most common factor which places the neonates at higher risk.^{21,22}

A study established that among LBW neonates, the associated complication was ICH.²³ The other risk factors for intraventricular hemorrhage were gestational age less than 34 weeks, male gender, complicated labor, birth asphyxia and low body temperature.²³

Being a single center study was one limitation of this study. We were unable to record treatment outcomes among current set of neonates. Studies are required to further shed light on factors behind ICH among neonates delivered with fetal distress so that early diagnosis and management can be done to reduce the associated morbidity and mortality.

CONCLUSION

The frequency of intracranial hemorrhage in term

neonates delivered with fetal distress was quite high.






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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Usman	Data collection, Drafting.	
2	Muhammad Akram	Data collection.	
3	Muhammad Kaleem Raza	Methodology, Discussion.	
4	Muhammad Umar Shafiq	Study concept, Data analysis.	
5	Shahzadi Asma Tahseen	Data collection, Literature Review.	
6	Sarfraz Alam	Literature Review, Proof reading.	