

# Spectrum of birth trauma: A study from rural India

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## Abstract

**Background:** The effects of trauma sustained during the birth process may range from the very minor to those so severe as to be incompatible with life. Birth trauma in newborn may range from minor soft tissue injuries at birth to long bone fractures and broken collar bone, bleeds (cephalhematoma, subgaleal bleed and intra cranial bleeds) and peripheral nerve injuries. **Objective:** To determine the rate of birth trauma and the rates of specific types of birth trauma. **Methods:** prospective Longitudinal observational hospital based study was conducted at Neonatology Unit, Dept. of Pediatrics, Rural Medical College, Loni from September 2015 to September 2017 involving 17364 inborn live neonates and 2053 outborn neonates. **Results:** incidence among live inborn neonates is 7.25 per 1000 live births. Mean birth weight of the neonates was 2501.6±605.5 gms. The percentage of Birth trauma in the study population was 1.03% (200 out of 19417 total neonates) during the study period. The incidence of Cephalhematoma was 0.67%, Incidence of extracranial hemorrhage was found to be 69.5% (139 subjects). Of 69.5% of Extracranial hemorrhage 65% were Cephalhematoma and 4.5% were subgaleal hematoma. Soft tissue trauma was seen in 19.5% cases. 4.5% had brachi brachial plexus injury and 3.5% had scalpel trauma. **Conclusion:** percentage of birth trauma among the study population of 19417 is 1.03%. Incidence of birth trauma among live inborn neonates is 7.25 per 1000 live births. The incidence of Cephalhematoma was 4.54 per 1000 live births, Soft tissue trauma had incidence of 1.49 per 1000 live births Cephalhematoma seen in 65% was the commonest birth trauma Cephalhematoma was the most predominant birth trauma

**Key Words:** Birth trauma, neonates, rural

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Received Date: 10/08/2018 Revised Date: 12/09/2018 Accepted Date: 25/10/2018

DOI: <https://doi.org/10.26611/1014819>

## Access this article online

Quick Response Code:



Website:

[www.medpulse.in](http://www.medpulse.in)

Accessed Date:  
28 October 2018

## INTRODUCTION

Birth trauma are second only to asphyxia and infection as a cause of neonatal mortality.<sup>1</sup> Trauma to the infant that result from mechanical forces (i.e. compression, traction) during the birth process are categorized as birth trauma. Birth injuries are avoidable or unavoidable forms of birth trauma which occur during the process of labour and delivery. The effects of trauma sustained during the birth

process may range from the very minor to those so severe as to be incompatible with life.<sup>1</sup> Birth trauma in newborn may range from minor soft tissue injuries at birth to long bone fractures and broken collar bone, bleeds (cephalhematoma, subgaleal bleed and intra cranial bleeds) and peripheral nerve injuries. The causes are multifactorial and may follow normal, abnormal and operative abdominal and vaginal deliveries. The improvements in obstetric practices have resulted in reduced incidence of birth trauma cases especially in developed countries.<sup>2</sup> It has been estimated that only about 25% of deliveries are supervised by skilled attendants in the developing countries.<sup>3</sup> Most cases of birth trauma are self-limiting and have a favorable outcome. Nearly one half are potentially avoidable with recognition and anticipation of obstetric risk factors. Outcome in the neonate is the product of multiple factors. Successful prevention of birth trauma often depends on the evaluation of each pregnancy during the antenatal period with a view to detect potential predisposing

factors. However, the roles of different factors are not totally well defined. It is of utmost importance that causes of birth trauma within any geographical area be regularly viewed so as to clearly define preventive measure. This study was undertaken to review cases of mechanical birth trauma amongst the live births admitted to tertiary care unit to determine the incidence and its pattern.

### MATERIAL AND METHODS

The present prospective Longitudinal observational hospital based study was conducted at Neonatology Unit, Dept. of Pediatrics, Rural Medical College, Loni from September 2015 to September 2017.

#### Inclusion Criteria

1. Live born neonates delivered in our hospital
2. Live born neonates referred from outside

#### Exclusion Criteria

- a. All still births
- b. All neonates with lethal anomalies
- c. Neonates birth weight < 500gms.
- d. Neonates less than 28 weeks.

Prospective observation of 17364 inborn live neonates and 2053 outborn neonates referred to our hospital was carried out at our tertiary care hospital. After delivery, the newborns were examined thoroughly from head to foot to evaluate for birth trauma and details recorded in a predesigned proforma. Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22.0 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation.

### RESULTS

A total of 19417 newborns were observed over a period of 2 years from 1<sup>st</sup> September 2015 to 30<sup>th</sup> September, 2017 which consisted of inborns and outborns. Out of 17364 Inborn delivered neonates, 5205 were admitted in NICU which included 126 cases of birth trauma. Of the 2053 outborn sick neonates referred from other hospitals there were 74 cases of birth trauma. Hence total of 200 cases were found to have birth trauma. Thus incidence among live inborn neonates is 7.25 per 1000 live births.

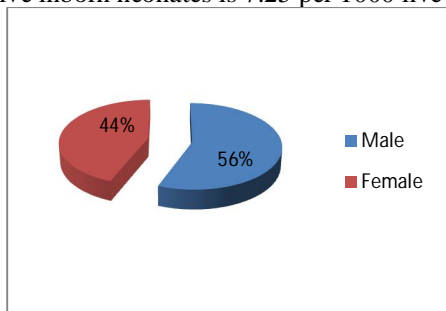


Figure 1: Distribution according to gender

In our study, 56% were male and 44% were female child.

Table 1: Distribution according to birth Weight (gms.) of neonates with birth trauma

Birth Weight (gms.)	No. of cases	Percentage (%)
<1000 (ELBW)	1	0.50
1000-1499 (VLBW)	13	6.50
1500-2499 (LBW)	72	36
>2500 (NORMAL)	107	53.50
>3500 (LGA)	7	3.50
<b>Total</b>	<b>200</b>	<b>100</b>
<b>Mean ± SD (gms)</b>	<b>2501.6 ± 605.5</b>	

53.5% of neonates with birth trauma were in normal weight range, 6.5% were VLBW and 3.5% were LGA. Mean birth weight of the neonates was 2501.6±605.5 gms.

Table 2: Percentage distribution of neonates with birth trauma

Type of Injury	No. of Injury	% in all Injuries (n=200)	% in study population (n=19417)
Cephalhematoma	130	65.0	0.67
Soft tissue trauma	39	19.5	0.20
Brachial Plexus Injury	9	4.5	0.04
Subgaleal hematoma	9	4.5	0.04
Scalpel trauma	7	3.5	0.03
Fractures	5	2.5	0.02
Splenic trauma	1	0.5	0.01
<b>Total</b>	<b>200</b>	<b>100.0</b>	<b>1.03</b>

The percentage of Birth trauma in the study population was 1.03% (200 out of 19417 total neonates) during the study period. The incidence of Cephalhematoma was 0.67%, soft tissue trauma was 0.2%, 0.04% was the percentage of brachial plexus injury and subgaleal hematoma each, scalpel trauma was seen in 0.03%, while fracture was seen in 0.02% and splenic trauma in 0.005%.

Table 3: Distribution according to Spectrum of Birth trauma in neonates

Type	No of cases	Percentage
Extracranial hemorrhage	139	69.5
Cephalhematoma	130	65.0
Subgaleal hematoma	9	4.5
Soft tissue trauma	39	19.5
Brachial Plexus Injury	9	4.5
Scalpel trauma	7	3.5
Fractures	5	2.5
Intra-abdominal trauma	1	0.5
<b>Total</b>	<b>200</b>	<b>100.0</b>

Incidence of extracranial hemorrhage was found to be 69.5% (139 subjects). Of 69.5% of Extracranial hemorrhage 65% were Cephalhematoma and 4.5% were subgaleal hematoma. Soft tissue trauma was seen in 19.5% cases. 4.5% had brachi brachial plexus injury and 3.5% had scalpel trauma. Fracture was detected in 2.5% of neonates while Intrabdominal trauma i.e splenic trauma was in 0.5%.

## DISCUSSION

**Table 1:** Comparative incidence of birth trauma among various studies:

Study	Total no. of babies	No. of cases of birth trauma	Incidence (per 1000 live births)
M. Bhalla <i>et al.</i> (1976) <sup>4</sup>	2650	120	45.2
Erin K. Sauber Schatz <i>et al.</i> (2003) <sup>5</sup>	890582		29
K Oluwadiya <i>et al.</i> (2003) <sup>3</sup>		146	7.25
Hajihe Borna <i>et.al.</i> (2005)	3596	148	41.16
R Senthil Prabhu <i>et al.</i> (2008) <sup>6</sup>	12735	283	22.22
Charusheela warke <i>et al.</i> (2010) <sup>2</sup>	5837	19	3.26
Masoumeh Abedzadeh- Kalahroudi <i>et al.</i> (2014) <sup>7</sup>	7154	161	22.5
Somosri Ray <i>et al.</i> (2014) <sup>8</sup>	4741	73	15.4
Present study (2017)	17364	126	7.25

Incidence of birth trauma per 1000 live births shows a trend of decline from 45.2 over the last 40 years as shown in the studies of M. Bhalla *et al.*(1976)<sup>4</sup> through K Oluwadiya *et al.*(2003)<sup>3</sup>, R Senthil Prabhu *et al.*(2008)<sup>6</sup>, Charusheela warke *et al.*(2010)<sup>2</sup>, Masoumeh Abedzadeh-Kalahroudi *et al.*(2014)<sup>7</sup> which continues in the present study 2017 to 7.25.

Reason for this trend may be better care provided by the obstetricians.

**Table 2:** Comparative incidence of individual birth trauma per 1000 live births

Spectrum of birth trauma	Study				
	M. Bhalla <i>et. al.</i> (1976) <sup>4</sup>	Hajihe Borna <i>et.al.</i> (2005) <sup>9</sup>	R Senthil Prabhu <i>et al.</i> (2008) <sup>6</sup>	Masoumeh Abedzadeh- Kalahroudi <i>et. al.</i> (2014) <sup>7</sup>	Present study(2017)
Total Incidence	45.2	41.16	22.22	22.5	<b>7.25</b>
Cephalhematoma	<b>25.6</b>	<b>21.41</b>	5.65	<b>12.85</b>	<b>4.54</b>
Soft tissue trauma	7.5				1.49
Erbs Palsy	1.1	3.62	0.8	0.69	0.51
Subgaleal Hematoma			0.47	3.07	0.23
Scalpel trauma					0.34
Fractures	0.3	15.57	0.31	0.97	0.05
Intra-abdominal trauma					0.05
Subconjunctival hemorrhage	4.7		<b>8.40</b>		
Subaponeurotic hemorrhage	0.3				
Intracranial Injury	10.5	0.28		0.41	
Facial nerve palsy	1.1	0.28	0.31	0.139	
Klumpkes paralysis	0.7				
Sternomastoid tumour	0.3		0.08		
Auricle Injury			0.4		

Incidence of cephalhematoma is the commonest in all studies including present study except R Senthil Prabhu *et al.*(2008)<sup>6</sup> in which subconjunctival hemorrhage was the highest 8.40 per 1000 live births. Trend of progressive decrease in cephalhematoma from 25.6 in M. Bhalla *et al.*(1976)<sup>4</sup> through 21.41 in Hajihe Borna *et.al.*(2005)<sup>9</sup> through 12.85 in Masoumeh Abedzadeh-Kalahroudi *et al.*(2014)<sup>7</sup> to 4.54 in the present study. Trend of progressive decrease in fractures from 15.57 in Hajihe Borna *et.al.*(2005)<sup>9</sup> to 0.05 in present study is observed. Trend of progressive decrease in Intracranial injuries from 10.5 in M. Bhalla *et al.*(1976)<sup>9</sup> to 0.41 in Masoumeh Abedzadeh-Kalahroudi *et al.*(2014)<sup>7</sup> was seen.

**Table 3:** Comparison of the spectrum of birth trauma(%)

Spectrum of birth trauma	Study								
	M. Bhalla <i>et al</i> ,(1976) <sup>4</sup>	K Oluwadiya <i>et al</i> (2003) <sup>3</sup>	Hajihe Borna <i>et.al</i> (2005) <sup>9</sup>	R Senthil Prabhu <i>et al</i> .(2008) <sup>6</sup>	Charusheela warke <i>et al</i> (2010) <sup>2</sup>	Masoumeh Abedzadeh - Kalahroudi <i>et al</i> (2014) <sup>10</sup>	Nibras H Hussain <i>et al</i> <sup>11</sup> (2012)	Somosri Ray <i>et al</i> (2014) <sup>12</sup>	Present study (2017)
Cephalhematoma	<b>56.6%</b>	15%	<b>49%</b>	25%	<b>38.7%</b>	<b>57.2%</b>	6%	17.8%	<b>65%</b>
Subgaleal Hematoma		4.1%		2.08%	12.9%			9.5%	4.5%
Caput Succedaneum							<b>82%</b>	6.3%	
Intracranial hemorrhage	23.3%	8.21%	0.6%			1.8%			
Soft tissue trauma	17.5%		1.2%	21.9%	9.6%	13%	7%	<b>38.3%</b>	19.5%
Clavicular fracture	1%	5.4%	35.6%	0.35%	9.6%	3.7%		5.4%	0.5%
Humerus fracture		9.58%		0.35%	6.4%			2.73%	2%
Femur fracture		9.58%		0.7%	3.2%		1%		
Rib Fracture						0.6%			
Facial nerve trauma	2.5%		0.6%	1.39%	9.6%	0.6%		5.47%	
Erbs palsy	2.5%	<b>41%</b>	8.2%	2.47%	6.4%	3.2%	1%	4.1%	4.5%
Klumpke Injury	1.6%								
Brachial Palsy		2.73%		1.06%					
Subconjunctival hemorrhage	10%			<b>37%</b>	3.2%	1.8%	3%	10.95%	
SCM trauma	0.8%			0.35%					
Intraabdominal trauma									0.5%
Subaponeurotic hemorrhage	0.8%								
Asphyxia			4.45%			16.8%			
Auricle Injury				1.74%					
Scalpel trauma									3.5%

Cephalhematoma was the most common birth trauma in our study and our result was comparable to other studies such as M. Bhalla *et al*, (1976)<sup>4</sup>, Hajihe Borna *et al* (2005)<sup>9</sup>, Charusheela warke *et al* (2010)<sup>2</sup> and Masoumeh Abedzadeh-Kalahroudi *et al* (2014)<sup>10</sup>. In contrast, the study by K Oluwadiya *et al* (2003)<sup>3</sup> Erbs palsy was the most common birth trauma, in study by R Senthil Prabhu *et al*.(2008)<sup>6</sup> subconjunctival hemorrhage was most common type of birth trauma, in study by Nibras H Hussain *et al* (2012)<sup>11</sup> caput succedaneum had the highest percentage and in study by Somosri Ray *et al* (2014)<sup>12</sup> soft tissue injuries was the commonest type of birth trauma.

### CONCLUSIONS

- In this study of 200 cases of birth trauma, 74 were outborn of 2053 sick neonates referred from outside whereas 126 were inborn of 5205 sick neonates admitted of 17364 live intramural neonates. Thus percentage of birth trauma among the study population of 19417 is 1.03%. Incidence of birth trauma among live inborn neonates is 7.25 per 1000 live births.
- The incidence of Cephalhematoma was 4.54 per 1000 live births, Soft tissue trauma had incidence of 1.49 per 1000 live births and brachial plexus injury had incidence of 0.51 per 1000 live births. Incidence of subgaleal hematoma was 0.23 per 1000 live births, Scalpel trauma incidence was 0.34 per 1000 live births, Fractures and Splenic trauma each had incidence of 0.05 per 1000 live births.
- 63% were inborn and 37% were outborn in our study.
- 56% were males and 44% were females.
- 35% were preterm, 54% were term and 11% were postterm.
- 43% were LBW, 53.5% were normal wt and 3.5% were macrosomic neonates.
- Cephalhematoma seen in 65% was the commonest birth trauma, followed by 19.5% of soft tissue trauma, 4.5% each of subgaleal hematoma and brachial plexus injury, 3.5% of scalpel trauma, 2.5% of fractures and 0.5% of intraabdominal trauma.
- Cephalhematoma was the most predominant birth trauma is inborn as well as outborns.

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Source of Support: None Declared  
Conflict of Interest: None Declared

