

## A clinical study of neonatal birth injuries in a tertiary care hospital-NICU, Bijapur

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### ABSTRACT

**Background:** Neonatal birth injuries are the third major cause of neonatal mortality in most developing countries. Very few studies have been done in India on birth injuries and its relation to various factors such as undesirable presentations and parity. **Aim:** The present study was conducted to analyze the birth injuries in our setup to know the various perinatal circumstances leading to birth injuries. **Materials and Methods:** An observational study was done in which 100 cases of birth trauma were noticed among 850 consecutive viable births during the study period of 2 years. Details of the health status of the mother, antenatal, intra-natal, and postnatal particulars, including the age, sex, weight, mode of delivery, type of presentation, and nature of the birth injury in different modes of delivery and type of presentation of the baby were taken. **Results:** It was found that of 850 newborn babies, 100 babies were found to have birth injuries, thus giving an incidence of 11.76% per 100 live births. Asphyxia formed the major groups which were noted in 45 babies. Cephalohematoma was the next common injury being noted in 32 cases. A total of 18 babies had soft tissue injuries and 4 babies had neurological injuries. **Conclusion:** Our findings support to use data on neonatal birth injuries as an indicator to assess the quality and safety of maternity units.

**Key words:** Birth injuries, Delivery, Perinatal


Birth injuries or birth trauma is defined as impairment or injury suffered by the neonate during delivery or during the entire birth process [1]. The predisposing risk factors for birth injuries can be classified into maternal, fetal, or birth attendants associated. The common risk factors of birth injuries are usually identified early in pregnancy or at an early stage of labor by trained health professionals, however, either due to lack of experience or poor facility setting, newborn incur a severe form of birth injury. The common risk factors for birth injuries are lack of supervision of pregnancy, maternal medical conditions, difficult labor, short or prolonged labor, obstructed labor, higher birth weight >4000 g, instrumental delivery, malpresentation, and maternal age <16 years or >35 years [2-5]. Injury may occur during labor, delivery, or after delivery, especially in neonates who require resuscitation in the delivery room. It can occur during both vaginal and cesarean deliveries [6].

Varied incidence has been reported in literature. It may be associated with increased morbidity and mortality [7]. There is a wide spectrum of birth injuries ranging from minor and self-limited problems (e.g., laceration or bruising) to severe injuries that may

result in significant neonatal morbidity or mortality (i.e., brachial plexus injury, clavicular fracture, and cephalohematoma) [8]. The overall incidence of birth injuries has declined with improvements in obstetrical care and prenatal diagnosis. The literature regarding birth injuries from Indian perspective is limited. The present study was, therefore, conducted to know the occurrence and scope of birth injuries and to know the factors leading to birth injuries.

### MATERIALS AND METHODS

The present observational study was conducted at the tertiary hospital of south India. Mothers who were having dystocia and complicated pregnancies were referred from other hospitals in the later stages of delivery. The study consisted of 100 cases of birth trauma noticed among 850 consecutive viable births during the study period of 2 years. All the neonates who suffered birth injuries during the study period were included in the study. The neonates with congenital fetal anomalies, congenital neuromuscular disorders, discharge against medical advice, not available for follow-up, and neonates whose parents or guardians did not agree to be a part of the study were excluded from the study. Written informed consent was taken from the parents/guardians. The study was approved by the Institutional Ethical Committee.

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The details of the health status of the mother, antenatal, intranatal, and postnatal particulars, including the age, sex, weight, mode of delivery, type of presentation, and nature of the birth injury in different modes of delivery and type of presentation of the baby were noted. Babies who were born were examined for evidence of birth injury. Each newborn baby was examined thoroughly and previous obstetric history, details of delivery, antenatal checkup, etc., were obtained. Statistical analysis was conducted using SPSS 25.0 Microsoft version.  $p < 0.05$  was considered statistically significant.

## RESULTS

Of the 850 newborn babies, 100 babies were found to have birth injuries, thus giving the incidence of 11.76% per 100 live births. Normal vaginal deliveries constituted 90% of the total deliveries followed by cesarean (7.05%), forceps (1.78%), and breech (1.17%). Asphyxia was the most common injury noted in 45 cases, cephalohematoma was noted in 32 cases, and 4 of the babies had neurological injuries. No fractures were noted among the babies, as shown in Table 1.

The incidence of birth injury in 100 cases was studied with relation to maternal age. Majority of the birth injuries were noted in the babies born to mothers between 21 and 25 years of age (32), followed by 26–30 years (26), 31–35 years (20), 15–20 years (19), and 36–40 years (3). In the present study, birth injury was noted mostly in the firstborn and normal vaginal delivery, as shown in Table 2.

Other findings were 87% of the injuries were noted in babies who were born by vertex presentation. In breech deliveries, 9% of the babies had injuries. Male babies were affected more than female babies, the ratio being 1.9:1. Birth injuries were less common in babies who were weighing <2000 g (18%) and highest among the children of 2001–3000 g (66%). The maximum incidence of birth asphyxia was recorded in vertex deliveries. Of 32 babies with cephalohematoma, 30 babies had cephalohematoma in parietal bones, of which 6 cases had biparietal cephalohematoma. Only two children had cephalohematoma over occipital bone. There were 29 babies with cephalohematoma who were delivered by vertex presentation, as shown in Table 3.

Of the 4 cases with neurological lesions, 3 were born normally. In 18 babies who had soft tissue injuries, 13 babies had forceps marks over the scalp and face. There was one child who was delivered normally had abrasion over the face and 4 children who were delivered by cesarean section had incision marks over the face.

## DISCUSSION

In the present study, the occurrence of birth injury among the total live births was 28/1000 or 11.76%. The incidence varies from place to place and in different parts of the world and is mostly determined by the standard of obstetrical management available. In developed countries like the United States, the incidence of birth trauma varies from 0.2 to 37/1000 live birth [9]. Warke *et al.* reported

**Table 1: Spectrum of birth injuries**

S. No.	Type of birth injury	No. of cases
1.	Asphyxia	45
2.	Cephalohematoma	32
3.	Soft tissue injuries	18
4.	Neurological injuries	4
	a. Facial nerve palsy	4
5.	Subaponeurotic hemorrhage	1

**Table 2: Birth order and nature of deliveries**

Birth order	Number	Nature of delivery	Percentage of birth injuries
I	68	Normal vaginal	79
II	10	Forceps	14
III	09	Breech	02
IV	05	Cesarean	05
V	05		
VI	03		

**Table 3: Types of presentation and cephalohematoma**

S. No	Presentation	Number of cases
1.	Type of presentation	
	a. Vertex	29
	b. Breech	01
	c. Face	02
2.	Showing the type of delivery and cephalohematoma	
	a. Normal vaginal	19
	b. Forceps	13

an incidence of 3.2/1000 live birth in Indian population [10]. Ray *et al.* reported an incidence of 15.4/1000 [11].

In the present study, asphyxial injuries (45) were the commonest followed by cephalohematoma (32). Ray *et al.* noted soft tissue injuries, whereas Pinto *et al.* reported lacerations as the most common injury in the Indian population [11,12]. However, Alexander *et al.* in the US population noted lacerations as the most common birth injury [13].

The maternal age may be a contributing factor to the occurrence of birth injury, as reported in the present study. A similar influence was seen in the study by Abedzadeh-Kalahroudi *et al.* [14]. If the mother is very young or if she is elderly primipara, the birth canal is rigid, the head has to be molded under pressure and body is squeezed through the rigid birth canal resulting in injury to the fetus. About 8% of the babies were born to grand multipara mothers. In grand multiparous, the resilient birth canal may make the fetus lie in the abnormal position; hence, birth injuries are common.

In our study, 68% of the babies with birth injuries were first-order born. The incidence of injuries diminished as the birth order increased. In the present study, male to female ratio was 1.95:1 and the males were more vulnerable to develop birth injuries. This is in accordance with the findings by Warke *et al.* [10]. However, it is in contrast to the findings by Ray *et al.* [11] and

Pinto *et al.* [12] who reported female predominance. Linder *et al.* have reported that the risk of birth injuries was not related to the gender of the child [15].

The birth weight of the baby is correlated to birth injuries. The small babies are more susceptible to hypoxic injuries or traumatic insults during the delivery and labor and sustain brain damage in the immediate neonatal period. Simultaneously, the babies that are large are particularly prone to suffer from traumatic damage during labor. Similar results were reported by Gudmundsson *et al.* [16] and Nassar *et al.* [17]. Several times, nature of birth injuries is determined by the mode of delivery. Soft tissue injuries could occur in babies who are delivered by vaginal delivery, but if there is prolonged labor, there are chances of evolving asphyxia.

Majority of the injuries were noted in the babies born by vertex presentation as the outlet was rigid and labor was prolonged when the head was large. Whenever there is an arrest of descent of head, forceps may have to be applied. This results in compression and molding of the head leading into soft tissue injuries, fetal distress, and asphyxia and sometimes cephalohematoma. It is expected that in breech presentation, there will be a difficulty while delivering the head. Cephalohematoma was reported in 12 of the cases delivered by forceps. Similar results were reported by Ray *et al.* who reported forceps to be associated with high (73.97%) neonatal birth trauma [11]. The fracture of the skull was not noticed in the present study. Contrary to the frequently cited belief, the incidence of facial palsy was not greater in infants delivered with the aid of forceps. Nerve injuries though uncommon, facial nerve palsy related to forceps application, and brachial plexus injuries due to shoulder dystocia and breech extraction occur [18].

In our study, 18 children had soft tissue injury, 5 children sustained incision marks during cesarean section. There were 13 children who had incision marks over the face and scalp. Superficial abrasions may occur in the scalp or face following the application of forceps or vacuum extraction. During the cesarean section, the uterine incision may inadvertently involve the underlying infant. In a recently published study in 2020 by Rehm *et al.*, the authors concluded that the data on neonatal birth injuries were an indicator to assess the quality and safety of maternity units [19].

The present study had a few limitations. It would have been worthwhile to identify the proportion of birth trauma following an emergency cesarean section. Second, the exact correlation could not be assessed due to the small sample size.

## CONCLUSION

Issues of birth trauma should be a part of obstetricians' basic training. In addition, an experienced neonatologist could be helpful for diagnosing accurately, and professional management

of the injured newborns. Our findings support to use data on neonatal birth injuries as an indicator to assess the quality and safety of maternity units.

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