

Original Article



Evaluation of Risk Factors of Birth Injuries in a Tertiary Care Hospital

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Abstract

Background: Birth trauma usually occurs, particularly in long and difficult labour or fetal mal presentations. Although with advancement in technology and improved obstetric care and liberal use of cesarean section deliveries, serious birth trauma is decreasing worldwide. Appraisal of common triggers of birth trauma is the key ingredient for provision of high quality prenatal & perinatal care to reduce the incidence and severity of birth trauma.

Objective: To evaluate the risk factors of birth trauma.

Materials and Methods: This case control study was carried out in the department of Neonatology, Dhaka Medical College Hospital from 14th August, 2018 to 14th February, 2019. Total 100 newborns were enrolled in the study. Among them 50 were cases, diagnosed as birth injury & 50 were controls without birth injury.

Results: Most common birth injury encountered, was caput succedaneum 15 (30%). The next common injuries were cephalohematoma was 11 (22%) & subgaleal hemorrhage 11 (22%). Other injuries were skin & soft tissue injury in 5 (10%), followed by sternomastoid hemorrhage, accidental cut injury, clavicular fracture, humerus fracture, facial nerve palsy, erbs palsy, subconjunctival Haemorrhage. The predisposing factors for mechanical birth trauma were primiparity ($P = 0.005$), advanced maternal age (28.99 ± 5.4) > (26.5 ± 4.5) (p value = 0.01), mal presentation ($P = 0.05$), oxytocin use ($P < 0.01$), Prolonged labor ($P < 0.01$), large size of the baby ($p=0.046$), VD ($p=0.004$).

Conclusion: The study concluded that the commonest birth injury was caput succedaneum and primiparity, advanced maternal age, prolonged labor, large sized baby, mal presentation were the significant risk factors for birth injury.

Key words: Birth injury, Caput Succedaneum, Primiparity, Neonates.

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Introduction

Labor is an intensive care situation. The woman and her unborn infant are at potential risk from unpredictable acute emergencies. The 19th century was witness to many detailed autopsy clinical studies relating birth trauma to fetal presentation and mode of delivery. Despite a declining incidence due to improvements in obstetrical care and prenatal diagnosis, birth injuries remain a significant cause of morbidity and mortality. Birth injuries are defined by the National Vital Statistics report as "an impairment of the infant's body function or structure due to adverse influences that occurred at birth." It can occur antenata

ly, intra-partum or during resuscitation. The significance of birth injuries may be assessed by review of mortality data. In 1981, birth injuries ranked 6th among major causes of neonatal death, resulting in 23.8 deaths per 100,000 live births.¹ During ensuing decade because of refinements in obstetric techniques and the increased use of cesarean deliveries over difficult deliveries dramatic decline occurred in birth injuries as a cause of neonatal death. Statistics for 1993 revealed a reduction to 3.7 deaths per 100,000 live births.² The most recent figures available for 2005, the mortality rate in USA were 0.6/100,000 live births.³ The overall incidence of birth trauma reported from USA ranges from 6 to 8 injuries per 1000 live births.⁴ The diagnosis and its

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notification in Indian setup is nearly impossible as the majority of deliveries are still conducted by unskilled, self-acclaimed birth attendants and even in tertiary medical institutions, autopsies are seldom performed. The Indian literature is depleted with information on birth trauma. Guhaet al., 1970, observed the incidence of birth trauma as 6.8/1000 live births.⁵ In this connection it is mentionable that about 4% neonatal death of Bangladesh is caused by birth injury. (BDHS 2004).⁶ The incidence of birth trauma varies based on type of delivery, fetal presentation, and types of injury and is reported to be between 0.2 and 41.2 per 1000 birth.⁷ It seems that the rate of neonatal trauma will never be zero because birth injury will occur in the optimal condition, best obstetrical care and diagnosis, and even in the absence of any risk factors.⁸ Rate of birth trauma is about 2% in normal vaginal delivery (NVD) with cephalic presentation and 1.1% in cesarean section (C/S).^{8,9} Birth injuries include soft tissue injuries (bruises, petechiae, subcutaneous fat necrosis, ulceration, and perforation), cephalohematoma, caput succedaneums, spontaneous intracranial hemorrhage, spinal cord injury, brachial plexus injury (Erb's palsy and Klumpke's palsy), brachial plexus injury (Erb's palsy and Klumpke's paralysis), facial nerve palsy, musculoskeletal injury (clavicular fracture and torticollis), and hypoxic-ischemic injury.¹⁰ In most studies cephalohematoma and clavicular fracture were the most frequent birth injuries.¹⁰⁻¹² Moreover, there are different risk factors for birth injuries, such as instrumental delivery, gestational age at delivery, preterm rupture of membranes (PROM), academic degree of birth attendance, induction of labor, neonatal weight, height, and head circumference, prolonged labor, breech delivery, macrosomia, shoulder dystocia, maternal pelvic abnormalities, parity, and maternal age.^{7-12,13-15} Some studies have shown lower risk of birth trauma for C/S delivery.^{9,12,14} In our perspective it is very much difficult to prevent birth trauma where most of deliveries in rural setup are first attended by traditional birth attendants without any formal medical training. So ensuring appropriate training & time required referral may help the obstetrician to plan the mode of delivery and thus preventing birth injury, before much time has been lapsed. Identification of birth injuries and related factors is necessary for implementing treatment procedures and determine prognosis as well as their diagnosis and use of appropriate methods of obstetric cares and timely C/S, which can prevent and reduce the prevalence of these injuries. The aim of the present study was to determine the incidence of fetal injury at delivery, classify the types of injury, and analyze the relationship between birth injury and risk factors.

Materials and Methods

A case control study was done in NICU, Department of Neonatology & Post-natal ward, Gynae&Obs department, Dhaka Medical College Hospital, from 14th August, 2018 to 14th February, 2019. Subjects of the study were all neonates admitted to NICU, DMCH born with history of Birth trauma. Total 100 newborns were enrolled in the study. Among them 50 were cases, diagnosed as birth injury & 50 were controls chosen by every alternate healthy baby. Inclusion criteria were, both term and preterm babies having injury at birth. Gestational age < 28 weeks and >42 weeks, birth weight <1000 gm, still birth babies, major congenital anomalies were excluded. Each newborn was immediately examined thoroughly after fulfilling the inclusion

and exclusion criteria, patient was enrolled with unique ID and Informed consent was obtained accordingly. The pre-structured Case Record Form (CRF) was filled up. Detailed history, complete physical examination and relevant investigations was done for obtaining diagnosis. Maternal parity, weight, height, oxytocin use, duration of labor, shoulder dystocia, mode of delivery, neonatal variables such as sex, maturity, birth weight, and resuscitation requirements was analyzed. Data was processed and analyzed with the help of computer program SPSS (Statistical Package for Social Sciences) win version 16. Quantitative data was expressed as mean and standard deviation and qualitative; data was expressed as frequency and percentage. Comparison was done by Chi-Square (χ^2) test and unpaired t-test where necessary. A probability (p) value of < 0.05 (p<0.05) was considered statistically significant.

Results

Table I: Demographic characteristics in case and control groups (N= 100)

Variable cases	Case	Control	P-value
Maternal Age mean \pm SD(yr)	28.99 \pm 5.4	26.5 \pm 4.5	0.01
Primiparous	40(80%)	27(54%)	
Multiparous	10(20%)	23(46%)	0.005697
Gestational Age at delivery week mean \pm SD	38.22 \pm 2.34	37.11 \pm 2.17	0.001
Birth weight, mean \pm SD (g)	2760 \pm 615.77	2629 \pm 416	0.046
Male baby	28(56%)	14(28%)	
Female baby	22(44%)	36(72%)	0.01
Mode of delivery			
VD	37(74%)	23(46%)	
LSCS	13(26%)	27(54%)	0.01
Socio-economic status			
Low income class	16(32%)	19(38%)	
Middle Income Class	33(66%)	28(56%)	
High income class	1(2%)	3(6%)	
Instrumental delivery	3(6%)	0	

Table I Shows that the data for the case & control group regarding maternal age reveals it is slightly higher in case group (28.99 \pm 5.4) in comparison to control group (26.5 \pm 4.5). Primiparity was significantly higher in case group (80%). The mean gestational age were (38.22 \pm 2.34 weeks) higher in case group then (37.11 \pm 2.17) weeks in control group (0.001). Mean

birth weight was also higher in case than control group $2760 \pm 615.77(g) > 2629 \pm 416(g)$. Male infant sex was double 28(56%) in traumatic neonates than in neonates with no trauma. VD was significantly higher in cases 37(74%) than controls 23(46%). Majority of patients came from middle income family 33 (66%) followed by low income family 16(32%). The incidence of instrumental delivery was much less in this study, only 3 in case group, while there was none in control group.

Table II: Pattern of different types of birth trauma in cases (n=50)

Type of birth trauma	Frequency (n)	Percentage (%)
Caput succedaneum	15	30
Cephalhaematoma	11	22
Subgaleal Hemorrhage	11	22
Skin hematoma/Soft tissue injuries	5	10
Sternomastoid Hemorrhage	2	4
Accidental cut injury	2	4
Clavicular fracture	1	2
Humerous Fracture	1	2
Facial nerve palsy	1	2
Sub conjunctival Hemorrhage	1	2
Erb's palsy	1	2

Table II shows different spectrum of trauma in 50 cases & most commonly encountered trauma among study group was caput succedaneum followed by cephalohematoma. Out of the above mentioned 50 cases, 3 patients had both caput succedaneum & subarachnoid hemorrhage, 1 patient had both caput succedaneum & cephalhaematoma, 1 patient had both cephalhaematoma & sub arachnoid haemorrhage.

Table III: Comparison of presenting parts as a predictor of birth trauma (N=100)

Presentation	Cases	Control	P-value
	No	No	
Vertex	35	46	0.05
Breech	11	03	
Others	4	01	

Table III shows that among the babies having malpresentation, birth injury occurred in 15 patients (78.94%) in comparison to only 4 (21.05%) patients having no birth injury.

Table IV: Comparison of Induction as a predictor of birth trauma (N=100)

Oxytocin use	Case	Control	P value
	No (%)	No (%)	
Yes	31(62%)	06(12%)	0.01
No	19 (38%)	44 (88%)	

Table IV shows that the rate of trauma was significantly high in patients having trials with oxytocin 31 babies (62 %) in comparison to only 6 (12%) without trauma.

Table V: Comparison of duration of labor as a predictor of birth Trauma (N=100)

Duration of labour	Case	Control	P value
	No (%)	No (%)	
Normal	36(23%)	46(78%)	0.00924
Prolonged	14(77.7%)	4(22.22%)	

Table V shows that among the babies delivered after prolonged labour, significant number of babies had birth trauma 14 (77.7%) in comparison to only 4(22.22%) babies having no trauma.

Table VI: Comparison of parity as a predictor of birth trauma (N=100)

Parity	Case	Control	P value
	No (%)	No (%)	
Primiparous	40(59.70%)	27(40.29%)	0.005697
Multiparous	10(41%)	23(60%)	

Table VI shows that the occurrence of birth injury was significantly high in primiparous group 40 (59.70%) then in control group 27(40.29%)

Table VII: Comparison of mode of delivery as a predictor of birth trauma (N=100)

Mode of delivery	Case	Control	P value
	No (%)	No (%)	
VD	37(74%)	23(46%)	0.004267
LSCS	13(26%)	27(54%)	

Table VII shows that Birth injuries, were more frequent in vaginal deliveries (37/50) i.e. (74 %) as compared to caesarean deliveries (13/50) i.e. (16.1%)

Table VIII: Comparison of glysemic status of mother as a predictor of birth trauma (N=100)

Glycaemic status of mother	Case	Control	P value
	No (%)	No (%)	
Diabetic	9(45%)	11(55%)	0.617
Non diabetic	41(55%)	39(45%)	

Table VIII shows that there was no significant relationship of birth injury regarding gestational DM as there was no higher rate of injury 9(45%) in comparison to control group 11(55%).

Table IX: Comparison of Hypertension as a predictor of birth trauma (N=100)

BP Of mother	Case	Control	P value
	No (%)	No (%)	
Hypertension	12(63%)	7(37%)	0.202475
No Hypertension	38(37%)	43(63%)	

Table IX shows that there was no relationship of babies having hypertensive mother with birth injury. The rate of birth injury was 12 (63.15%) in case group & 7(36.84%) in control group.

Discussion

Birth injuries account for fewer than 2% of neonatal deaths. Infant mortality as a result of birth trauma, has fallen. This decrease partially reflects the technologic advancements that allow obstetricians to recognize birth trauma risk factors using ultrasonography and fetal monitoring prior to attempting vaginal delivery. The reported incidences of birth trauma vary, but show a decrease in comparison with historical references. Recent studies have reported that major birth trauma occurs in 3% of all live-born infants, accounts for 2% of all neonatal mortality, and accounts for 10% of all neonatal deaths in full-term infants.

Annual report 2017 of paediatrics department of Dhaka Medical College revealed that birth trauma occurred in 204 out of 9828 (22 per 1000 live births). The incidence was similar with the study of Kashan, Iran (22 per 1000 live births)¹⁶ and with the study of Chennai, India¹, again it is much more higher in comparison to study of Mumbai, India¹⁷ where it is 0.2 to 2 per 1000 live births. The study of Karachi¹⁸ demonstrated an incidence of birth trauma of 41.16 per 1,000 live births, which was approximately double with the result of our study. Demographic characteristics revealed that 56% male baby 44% female baby with a male female ratio 1.2:1.

Maternal age was significantly higher in case group (28.99 ± 5.4) in comparison to control group (26.5 ± 4.5) (p value =0.01) which is not similar with the study of Karachi, Pakistan¹⁸ But similar with the study of kameroon¹⁹. Gestational Age at delivery week in case group (38.22 ± 2.34SD) was significantly higher in comparison to control group (37.11 ± 2.17) (p value =0.001) which is similar with the study of Karachi, Pakistan¹⁸. Birth weight was slightly higher in case group (2760 ± 615.77) in comparison to control (2629 ± 416) group which is similar to Karachi, Pakistan¹⁸ and Kameroon¹⁹ which is not similar with the study of Karachi, Pakistan.¹⁸ Social status of the patients was also recorded in the study and it shows that majority of patients came from middle income class 33(66%) followed by low income class¹⁶ (32%) and the remaining from high class out of 50 cases.

Most common birth injury encountered was caput succedaneum 15 cases (30%). In the study of Mashhad, Iran²⁰ and in the study of Bagdad, Iraq²¹, caput succedaneum was considered as trauma and on the other hand caput succedaneum was not considered as trauma in Kashan, Iran.¹⁶ The next common injuries were bleeds, of which cephalohematoma was 11 cases (22%) & subgaleal bleed was also 11 cases (22%). In the study of Kashan, Iran¹⁶, The most common injury was cephalhaematoma. Another common injury was skin & soft tissue injury in 5 cases (10%), followed by three unique type of birth injuries for this study and these are sternomastoid hemorrhage, accidental cut injury with the same frequency each of two cases (4%) and the others were clavicular fracture, humerus fracture, facial nerve palsy, Erbs palsy, subconjunctival Hemorrhage having less frequency and each 1 in no (2%).

Most common obstetrical complications found in study group are malpresentation 15 (30%), Among the babies having birth injury 15 patients (78.94%) had malpresentation in comparison to only 4 (21.05%) patients iprolonged labour 14(28%) which is similar to study of Chennai, India (74%)¹, In our study, among the babies delivered after prolonged labour, significant number of babies had birth trauma 14 (77.7%) in comparison to only 4(22.22%) babies in control group.

The rate of trauma was significantly high in patients having trial with oxytocin, 31 babies (83.78 %) in comparison to only 6 (16.2%) without oxytocin which is statistically significant (P < 0.01). which is similar to study of Chennai, India¹.

Prolonged labour 14(28%) which is similar to study of Chennai, India (74%)¹, In our study, among the babies delivered after prolonged labour, significant number of babies had birth trauma 14 (77.7%) in comparison to only 4(22.22%) babies.

In this study, among the babies of primiparous mother the occurrence of birth injury was significantly high in cases 40 (59.70%) then in control group 27(40.29%) An increased rate of primiparity was present in this study which is statistically significant (P =0.005) and comparable with other studies Chennai¹ where the rate of injury was clearly high (77.03%) in case group born to primiparous then the rate of controls (47.27%) & also similar with the study of Kashan, Iran¹⁶ where among the traumatized patients the rate of primiparity was higher 3% then the control group is 1.7%.

Birth injuries, in our series, were more frequent in vaginal deliveries (37/50) i.e. (74 %) as compared to caesarean deliveries (13/50) i.e. (16.1%) which is similar to Kashan, Iran¹⁶ Which shows the rate of trauma was obviously high 3.6 % in babies having NVD, then the babies having caesarean section 1.2% and there are only 2 cases of all our birth injury cases were associated with instrumental deliveries (forceps and vacuum). which was much less significant in comparison to other studies (Bombay hospital²)25.8%. In Karachi, Instrumental delivery was significantly enlarged (80%).²²

In this study other obstetrical complications were pregnancy-induced hypertension/pre-eclamptic toxemia (PIH/PET)/ eclampsia¹² (24%), gestational diabetes mellitus (GDM) 9 (18%),

In control group, malpresentation 4 (8%), prolonged labour 4(8%), PIH/PET/eclampsia 7(14%) were found in decreasing order of frequency except GDM 11 (22%) which was slightly high.

Conclusion

Most common birth injury encountered was caput succedaneum. Other birth injuries were cephalhaematoma, subgaleal haemorrhage & soft tissue injury. The study also concluded that primiparity, advanced maternal age, prolonged labour, large sized baby, malpresentation, oxytocin induction were the significant risk factors for birth injury .

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