

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400 Volume: 9 Issue: 5 Page N. 19-25 Year: 2025

Original Article

www.wjahr.com

RISK FACTORS FOR NEONATAL BIRTH TRAUMA. RETROSPECTIVE, CASE CONTROL STUDY

Dr. Rehab Mohammed Kheder*

M.B.Ch.B., A.B.H.S. (Pediatric)/Al-Batool Teaching Hospital.

Article Received date: 24 February 2025Article Revised date: 15 March 2025Article Accepted date: 05 April 2025



*Corresponding Author: Dr. Rehab Mohammed Kheder

M.B.Ch.B., A.B.H.S. (Pediatric)/Al-Batool Teaching Hospital.

ABSTRACT

Background: Birth injuries, often caused by labor forces or fetal mal-presentations, are common and can lead to significant mortality in the first 28 days of life. Early diagnosis and treatment are crucial, but newborns with inadequate care face higher mortality rates. **Aim of the study:** to investigate the common predisposing factors for neonatal birth trauma (NBT) in Mosul city. **Patients and Methods:** A case control study was conducted at Al-Batool Teaching Hospital from January to September 2024, involving 54 newborns; 27 of them had birth trauma. Both term and preterm babies with injury at birth, and excluded those with major congenital anomalies. Data were analyzed using SPSS version 26. The study included a comprehensive examination of each newborn, including a detailed history, physical examination, and relevant investigations. **Results:** The study found that cases of gestational age 30weeks+ had a higher risk of NBT compared to controls. Nulli para was a significant risk factor in 81.5% of cases, while primigravida was a risk factor in 12.57 times. Abortion was considered a protective factor in only 7.4% of cases. Co-morbidities were found in 48.2% of cases and 33.3% of controls, with NPOL being the commonest. No significant differences were found in birth weight and gestational age. **Conclusion:** Younger age mother, nullipara, primigravida, Facility-based emergency CS delivery, duration of ARM more than 30 min, and female sex were predisposing factors associated with NBT. Neither gestational age nor the birth weight showed role.

KEYWORDS: Birth Trauma, Neonatal Outcomes, Risk Factors.

INTRODUCTION

Birth injuries (BI) are defined as impairment of newborn bodily function caused by unfavorable events during birth, which might be preventable or unavoidable. Birth trauma is common, especially after tough labor or fetal mal-presentations, despite accurate prenatal care.^[1]

Worldwide, about 5.4 million children under the age of five were lost. About 2.5 million Fatalities (46%) occurred within the first 28 days of life.^[2] Early detection and treatment of severe birth trauma can improve survival rates.^[3]

Birth injury typically happens in the second stage of labor due to natural labor forces, contractions, traction of neonates, and twisting through the delivery canal, or as a result of obstetric intervention.^[4] Minor soft tissue injuries can range from self-limiting to serious and life-threatening.^[5] Early identification and care are crucial.

The following are examples of birth injuries: facial nerve palsy, musculoskeletal injuries (clavicular fracture and

torticollis), cephalohematoma, caput succedaneums, spinal cord injury, spontaneous intracranial hemorrhage, brachial plexus injury (Erb's palsy and Klumpke's paralysis), soft tissue injuries (bruises, petechiae, subcutaneous fat necrosis, ulceration, and perforation), and hypoxic-ischemic injury.^[6]

Fetal factors like macrosomia, fetal height, fetal weight, and extreme prematurity and postdate were associated with a higher risk of neonatal birth injury; maternal factors like parity, poor maternal health, pelvic abnormalities, and excessively young or old maternal age also contributed to neonatal birth injury.^[7,8] The newborn is also at risk for birth damage due to labor and delivery-related variables such as extended labor, fetal malpresentation and malposition, cesarean, and instrumental births.^[4] The risk of death within the first 28 days of life is higher for newborns with injuries and illnesses linked to inadequate care during childbirth, a shortage of a qualified healthcare professional, and a lack of treatment in the first few days of life. The leading causes of newborn mortality in 2017 were preterm birth and intra-

partum problems, including birth asphyxia and lack of breathing at delivery, infections, and birth abnormalities.^[2]

Birth injuries and associated variables must be identified in order to diagnose them, carry out treatment procedures, and establish prognosis. Appropriate obstetric care techniques and prompt C/S can also help prevent and lower the incidence of these injuries.^[1]

The current study aimed to investigate the magnitude and common predisposing factors for neonatal birth trauma in Mosul city.

PATIENTS AND METHODS

A case control study was done in NICU, Department of Neonatology & Post-natal ward, Gynecology & Obstetrics Department, Al-Batool Teaching Hospital, from the 1st of January to the 1st of September, 2024. Subjects of the study were all neonates admitted to NICU, born with history of birth trauma. Total 54 newborns were enrolled in the study. Among them 27 were cases, diagnosed as birth injury & 27 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 were done for obtaining diagnosis. Maternal parity, duration of labor, shoulder dystocia, mode of delivery, neonatal variables such as sex, maturity, birth weight, and resuscitation requirements were analyzed.

Data were processed and analyzed with the help of computer program SPSS (Statistical Package for Social Sciences) win version 26. Numerical data were expressed as mean and standard deviation and nominal data were expressed as frequency. Unpaired t-test where used for numerical data while the nominal data were assessed by Chi square test; and Fisher Exact test. A probability (p<0.05) was considered statistically significant.

RESULTS

The comparison of age groups between studied groups was demonstrated in table (1) which revealed that cases with age groups less than 20 years and those between 20 to 30 years were more frequent than those among the controls but these differences were statistically not significant with (p=0.111) and (p=0.580) respectively. Among the cases 22.2% were \geq 30 years while among the controls 48.2% were \geq 30 years; this age group was protective for the development of the disease with a statistically significant association (p=0.046).

 Table (1): Comparison of age groups between studied groups.

Age groups/	Cases (n=27)	Controls (n=27)	OP	059/ CI	n voluo*			
years	No.(%)	No.(%)	UK	9570 CI	p-value.			
<20	9(33.3)	4(14.8)	2.87	0.760, 10.865	0.111			
20-30	12(44.5)	10(37.0)	1.36	0.457, 4.041	0.580			
≥ 30 6(22.2) 13(48.2) 0.307 0.094, 1.001 0.046								
*Chi square test								

Nulli para was found among 81.5% of cases and 11.1% of controls and considered as significant risk factor (OR=35.20; p=0.000), while parity 2 and more were found to play protective roles (OR=0.091 for parity 2 and OR=0.064 for parity 5) and the associations were statistically significant at (p=0.024) and (p=0.000) in that order. Gravidity 1 appeared as risk factor (OR=12.57)

with statistical significant (p=0.000) whereas gravidity 6 was significantly protective (OR= 0.047; p=0.000). Regarding the abortion, only 7.4% of cases had abortion against 29.65 of controls; having an abortion was considered as protective factor with a statistically significant association (OR=0.190; p=0.036) as shown in table (2).

Table (2): Comparison of Obstetric parameters between studied grou
--

Obstetric parameters		Cases (n=27) No.(%)	Controls (n=27) No.(%)	OR	95% CI	p-value
	Nulli	22(81.5)	3(11.1)	35.20	7.517, 164.825	0.000*
Parity	1	2(7.4)	1(3.7)	2.08	0.177, 24.405	1.000**
	2	1(3.7)	8(29.6)	0.091	0.010, 0.793	0.024**
	5	2(7.4)	15(55.6)	0.064	0.012, 0.326	0.000*
Cassidity	1	20(74.1)	5(18.5)	12.57	3.434, 46.017	0.000*
Gravituity	2	4(14.8)	1(3.7)	4.52	0.470, 43.418	0.351**

L

	3	1(3.7)	4(14.8)	0.22	0.023, 2.123	0.351**	
	6	2(7.4)	17(63.0)	0.047	0.009, 0.242	0.000*	
Abortion	Yes	2(7.4)	8(29.6)	0.190	0.036, 0.999	0.036*	
Abortion	No	25(92.6)	19(70.4)	5.26	1.00, 27.690	0.036*	
*Chi square test; ** Fisher Exact test							

Comparison of the co-morbidities between studied groups was demonstrated in table (3), this table elicited that the co-morbidities were found among 48.2% of cases and among 33.3% of controls and considered as risk factor (OR=1.85) but statistically this difference was not significant (p=0.268).

Co-morbidities	Cases (n=27)	Controls (n=27)	OR	95% CI	p-value*
Present	13(48.2)	9(33.3)	1.85	0.618, 5.579	0.269
Absent	14(51.8)	18(66.7)	0.538	0.179, 1.617	0.208
*Chi square test					

Among the cases, the most frequent co-morbidities was NPOL which found among 5 patients while among the controls, meconium, oligohydramnios, and GHT were most common and found in two individuals as shown in figure (1).



Figure (1): Co-morbidities among the studied groups.

Comparison of labour parameters between studied groups were demonstrated in table (4) which found that emergency CS, female sex, and duration of ARM more than 30 min considered as risk factors but the associations were statistically not significant.

Table ((4):	Com	parison	of]	Labour	parameters	between	studied	group	s.
I able (Com	parison		Labour	parameters	been cen	Studicu	Stoup	••

Labour parameters		Cases (n=27)	Controls (n=27)	OD	050/ CI	p-value	
		No.(%)	No.(%)	OK	95% CI		
Mode of delivery	Emergency CS	11(40.7)	10(37.0)	1.16	0.390, 3.494	1.000*	
whole of derivery	NVD	16(59.3)	17(63.0)	0.85	0.286, 2.558	1.000*	
Sov	Males	16(59.3)	21(77.8)	0.41	0.126, 1.364	0.143*	
Sex	Females	11(40.7)	6(22.2)	2.40	0.733, 7.897	0.143*	
	At delivery	9(33.3)	10(37.0)	0.85	0.277, 2.600	1.000*	
	<30 min	0(0.0)	2(7.4)	0.0		0.491**	
	30-60 min	2(7.4)	1(3.7)	2.08	0.177, 24.405	1.000**	
Duration of ARM	1 -1.5 hour	0(0.0)	3(11.1)	0.0		0.236**	
	1.5-2 hours	6(22.2)	1(3.7)	7.42	0.828, 66.622	0.100**	
	2-3 hours	1(3.7)	4(14.8)	0.22	0.023, 2.123	0.351**	
	>3 hours	9(33.3)	6(22.2)	1.75	0.522, 5.866	0.362*	
*Chi square test: **	Fisher Exact test						

I

L

The neonatal outcomes among the cases showed that subgaleal hematoma was the most frequent that found among 92.6% as illustrated in figure (2).



Figure (2): Neonatal outcomes among cases.

Comparison of neonatal parameters between studied groups was demonstrated in table (5) which revealed that there were no significant statistical differences between cases and controls concerning the birth weight and gestational age.

Table (5):	Comparison	of Neonatal	parameters	between	studied	grou	ps.
= = = = = = = = = = = = = = = = = = = =			r			8	

Noonatal naramatara	Cases (n=27)	Controls (n=27)	n voluo*				
Neonatai parameters	Mean± SD	Mean± SD	p-value.				
Weight (kg)	3.38±0.431	3.36±0.503	0.829				
Gestational age (weeks)	38.66±1.386 38.48±1.188		0.601				
*t-test for independent two means							

Concerning the lab. Findings of cases, the figure (3) showed that the mean WBC was 18.82±9.275, mean Hb

17.0±1.695, mean PCV 49.32±5.50, mean PLT 229.93±102.329, and mean TSB 4.25±1.920.





I

Management among cases was demonstrated in figure (4) and showed that 74.1% was observation, followed by

intensive phototherapy (7.4%) and phototherapy with blood transfusion (7.4%).



Figure (4): Management among cases.

DISCUSSION

NBT is one of the leading causes of newborn morbidity and death. Neonatal morbidity and death rates from birth trauma vary globally. Providing obstetric and neonatal services during prenatal care, birth, and hospitalization is critical for decreasing the burden of NBT.^[9]

In the current study, younger maternal age was also found to be significantly associated with neonatal birth injury, the mother age group less than 30 years was associated with NBT in comparison to controls although the difference was statistically not significant. This study finding was also found to be consistent with the study conducted in low and middle income countries; Neal et al.,^[10] and Belay et al.,.^[11] In the similar manner, Tolosa et al.,^[12] reported that the mean and SD for maternal age was 24.12 ± 4.61 years. Of these, 189 (38.4%) mothers were aged 20 to 24 years, and 138 (28%) were 25 to 29 years. This result might be explained by the fact that the pelvis and pelvic muscles of mothers with young age were contracted and tight enough, respectively, compared with mothers with old age, and this might predispose for neonatal birth injury.

In this study, nulliparity was found to be a predisposing factor for neonatal birth injury. Other studies conducted in Kashan, Iran^[6]; southwest Nigeria^[13], and in Chennai, India^[9] also support this finding.^[6, 9,13] This is due to the fact that neonates delivered from mothers with multiparty were less risky to develop neonatal birth injury than neonates delivered from women with primipara.^[14] This result is explained by the fact that the pelvic joints and muscles of the birth canal of primiparous women were tight compared to multiparious women and this may exert undue pressure on the fetal presenting part during the labor process. In contrary to the current findings, Tolosa et al.,^[12] found that out of the

total, 406 (82.5%) mothers were multiparous. Regarding the abortion, the current study found that the mother with no previous abortion were more likely to have birth trauma for their neonates, up to our knowledge no comparable studies were found.

In relation to the presence of maternal comorbidities, the current study found no significant difference which was corresponding to other previous studies as Tolosa et al.,^[12] and Staudt et al.,.^[15]

By assessment of mode of delivery, the current study showed no difference between NBT and control. Neonates delivered by instrumental delivery were 7.40 times more likely to suffer from birth trauma than those delivered by the caesarian section. The current finding is supported by other studies in different countries, such as Ethiopia^[16-18], India^[19], Nigeria^[20], and Pakistan.^[21] This might be related to the application of instruments such as forceps and/or vacuum on the fetal head during delivery, which may expose it to NBT.

Birth injury (BI), commonly occurs in the 2nd stage of labor as a result of normal forces of labor, contraction, twisting, and traction of neonates through the birth canal or as a sequel of obstetric intervention.^[4] It varies from self-limiting minor soft tissue injuries to severe, major life-threatening injuries that require early detection and intervention.^[5]

No significant difference between the current studied groups concerning the neonatal sex although females were more prone to have NBT, while the Tolosa et al.,^[12] study reported that the predisposing factors significantly associated with NBT were male sex. Moreover, Uchenna et al.,^[4] found that the number of males was twice the number of females enrolled.

Although ARM duration of more than 30 minutes was considered a risk factor in the current study, no statistically significant relationships were found compared with newborns born with a normal duration of labour. The finding was similar to the study in India^[8], a study in Nigeria^[13] and another study in Baghdad.^[22] This could be the fact that the longer the duration of labour the more likely the newborn might experience birth trauma.

In the current study, subgaleal hematoma was the most common neonatal result, accounting for 92.6% of cases. This was near the findings of Hussain and Seger^[22] study in Baghdad (82%) and the finding of Pius et al.,^[20] study in Nigeria (60.7%). The current finding was lower than a study in Ethiopia $(20\%)^{[23]}$ and India $(2.08\%)^{[9]}$ The difference might be due to the variation in the delivery and neonatal services in study settings. The difference might also be associated with the difference in the risk factors of birth traumas. For example, vacuum delivery might cause trauma to the head whereas shoulder dystocia might cause soft tissue injuries and fractures. Gupta and Cabacungan^[24] found in their study that the common types of NBT were extracranial trauma (73, 88%), soft tissue trauma (58,69.9%), musculoskeletal trauma (16,19.3%), and neurological trauma (12, 14.5%). Extracranial trauma: Forty (48.2%) neonates were diagnosed with cephalohaematoma. Twenty-three (27.7%) neonates had subgaleal hemorrhage. Among soft tissue traumas, facial and skin bruises accounted for 18(21%). Of the neurological traumas, facial palsy occurred in 5 patients (6%)

Regarding the neonatal birth weight, the current study showed no significant difference between cases and controls. This was differed from other studies which showed significant association between birth trauma and birth weight, a study conducted in Mumbai, India by Warke et al.,^[18], a study in Indonesia, by Aminullah et al.,^[25], a study in Baghdad Hussain and Seger^[22], a study in Cameroon by Mah et al.,^[26], and another study in India by Ray et al.,.^[8] The reason could be when a macrosomic baby pass through the maternal birth canal (pelvis), there might be cephalopelvic disproportions which in turn result in compression of the neonate's body by the narrowed or small maternal pelvis that can damage the neonate's body and cause trauma to the newborn.

Furthermore, gestational age at birth as early preterm was more likely to be exposed to NBT than term gestational age. This study was supported by other studies in Iraq^[27], Southwest Nigeria^[15], Pakistan^[3], and Iran.^[28] This is because preterm neonates are physically and physiologically immature, which exposes them to extra-cranial brain hemorrhage.

CONCLUSION

Younger age mother, nullipara, primigravida, Facilitybased emergency CS delivery, duration of ARM more than 30 min, and female sex were predisposing factors associated with NBT. Neither gestational age nor the birth weight showed role.

RECOMMENDATIONS

To lessen the burden of NBT, it is crucial to encourage delivery in a medical institution, avoid preterm birth, estimate intrauterine weight, and make early decisions to minimize emergency CS births. NBTs should be taken into consideration by the Ministry of Health, regional health offices, and healthcare practitioners.

REFERENCES

- Musharraf M, Jinnat M, Morshed S, Rahman S, Khan M, Shome A, et al. Evaluation of Risk Factors of Birth Injuries in a Tertiary Care Hospital. KYAMC Journal. 2022; 13: 129-133. 10.3329/kyamcj.v13i3.63054.
- 2. Organization WH. World health statistics 2019: Monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization, 2019.
- 3. Shabbir S, Zahid M. Risk factors and incidence of birth trauma in tertiary care hospital of Karachi. Pak J Surg., 2015; 31(1): 66-69.
- 4. Uchenna E, Chidiebere OD, Nwabueze AI. Birth injuries in newborn: aprospective study of deliveries in South-East Nigeria. Afr J Med Health Sci., 2021; 20(4): 41–6. doi: 10.5897/AJMHS2021.01498.
- 5. Yismaw A, Abebil T, Biweta M, Araya B. Proportion of neonatal sepsis and determinant factors among neonates admitted in University of Gondar comprehensive specialized hospital neonatal Intensive care unit Northwest Ethiopia 2017.
- Abedzadeh M, Talebian A, Jahangiri M, Mesdaghinia E, Mohammadzadeh M. Incidence of Neonatal Birth Injuries and Related Factors in Kashan, Iran. Archives of trauma research, 2015; 4: e22831. 10.5812/atr.22831.
- Seid SS, Ibro SA, Ahmed AA, Akuma AO, Reta EY, Haso TK, et al. Causes and factors associated with neonatal mortality in neonatal intensive care unit(NICU) of Jimma University medical center, Jimma, South West Ethiopia. Pediatric Health Med Ther., 2019; 10: 39. https://doi.org/10.2147/PHMT. S197280
- 8. Ray S, Mondal R, Samanta M, Sil A, *et al.* prospective study of neonatal birth trauma: Indian perspective. Journal of clinical neonatology, 2016; 5: 91.
- 9. Prabhu RS, Sajjid M, Anandan H. Incidence and predisposing factors of birth trauma in a tertiary care hospital in Chennai, India: a prospective study. Int J Sci Study, 2017; 4(10): 29-33.
- Neal S, Channon AA, Chintsanya J. The impact of young maternal age at birth on neonatal mortality: evidence from 45 low and middle income countries. PloS One, 2018; 13(5): e0195731. 10.1371/journal. pone.01957 31
- 11. Belay AS, Negese K, Manaye GA, Debebe S. Prevalence and associated factors of birth injury

among neonates admitted at neonatal intensive care unit (NICU) in governmental hospitals of Southwest Ethiopian people regional state, Ethiopia: A multicenteric cross-sectional study. Frontiers in Pediatrics, 2022; 10: 1052396. https://doi.org/10.3389/fped.2022. 1052396

- 12. Tolosa G, Assefa N, Keneni M, Lonsako AA, Desalew A. Neonatal Birth Trauma and Its Predisposing Factors Among Newborns Admitted to Public Hospitals in Eastern Ethiopia: A Cross-Sectional Study. Global Pediatric Health, 2923; 10: 2333794X231183814.
- Osinaike BO, Akinseye LO, Akiyode OR, Anyaebunam C, Kushimo O. Prevalence and predictive factors of birth traumas in neonates presenting to the children emergency center of a tertiary center in Southwest, Nigeria. J Clin Sci., 2017; 14(4): 167. 10.4103/jcls.jcls_62_16
- Emeka CK, Uchenna E, Tochukwu EJ, Chukwuebuka NO, Chikaodili ET, Chigozie IC. Profile of birth injuries in a tertiary hospital in Enugu, Nigeria. Am J Biomed Sci., 2019; 7(5): 99–103. 10.11648/j.ajbls.20190705.11
- 15. Staudt A, Baumann S, Horesh D, Eberhard-Gran M, Horsch A, Garthus-Niegel S. Predictors and comorbidity patterns of maternal birth-related posttraumatic stress symptoms: A Latent Class Analysis. Psychiatry Research, 2023; 320: 115038. https://doi.org/10.1016/j. psychres.2022. 115038
- 16. Workneh T, Netsanet W, Eshetu G. Birth injury and predisposing factors in Jimma University specialized hospital southwest Ethiopia; Ethiop. J Paediatr Child Health, 2016; 12(1): 32-42.
- 17. Yemane A, Yeshidinber A. Birth trauma among neonates admitted to neonatal unit in a tertiary hospital in Addis Ababa. Ethiop J Pediatrics Child Health, 2019; 14(1): 5-11.
- 18. Warke C, Malik S, Chokhandre M, Saboo A. Birth injuries-a review of incidence, perinatal risk factors and outcome. Bombay Hosp J., 2012; 54(2): 202-208.
- 19. Rizwan-u-zama NAJ, Thobbi AN, Vijay Katti S. A clinical study of neonatal birth injuries in a tertiary care hospital-NICU, Bijapur. Indian J Child Health, 2020; 7(7): 288-290.
- Pius S, Ibrahim H, Ibrahim B, Farouk A, Machoko Y, Bello M. Incidence and characteristics of neonatal birth injuries in Maiduguri North-Eastern Nigeria. Niger J Paediatr., 2018; 45(2): 99-105.
- 21. Saima Shabbir MZ. Risk factors and incidence of birth trauma in tertiary care hospital of Karachi. Pak J Surg., 2015; 31: 1.
- 22. Hussain NH, Seger AO. Risk factors of birth trauma of new born babies in Baghdad teaching hospital. Mustansiriya Medical Journal, 2018; 13: 5.
- 23. Tesfaye W, Workneh N, Girma E. birth injury and associated factors in jimma university specialized Hospital, Southwest Ethiopia. Ethiopian Journal of Pediatrics and Child Health, 2016; 12: 20–31.

I

- 24. Gupta R, Cabacungan ET. Neonatal Birth Trauma: Analysis of Yearly Trends, Risk Factors, and Outcomes. J Pediatr, 2021 Nov; 238: 174-180.e3. doi: 10.1016/j.jpeds.2021.06.080. Epub 2021 Jul 7. PMID: 34242670
- 25. Aminullah A, Budiwardhana N, Firmansyah A. Neonatal birth trauma: incidence and predisposing factors. Paediatr Indones, 2003; 43: 220–5. doi:10.14238/pi43.6.2003.220-5
- 26. Mah EM, Foumane P, Ngwanou DH, et al. Birth injuries in neonates at a university teaching hospital in Cameroon: epidemiological, clinical and therapeutic aspects. Open J Pediatr., 2017; 07: 51–8. doi:10.4236/ojped. 2017.71008
- 27. Al-Hiali SJ, Muhammed A, Khazraji AA. Prevalence, types, and risk factors of birth trauma among neonates at Al Ramadi maternity and children teaching hospital, Western Iraq. Ann Trop Med Public Health, 2020; 23: 231-812.
- 28. Nibras H, Hussain AOS. Risk factors of birth trauma of new born babies in Baghdad teaching hospital. Mustansiriya Med J., 2014; 13(1): 44.

Rehab.