ORIGINAL ARTICLE

BIRTH TRAUMA AMONG NEONATES ADMITTED TO NEONATAL UNIT IN A TERTIARY HOSPITAL IN ADDIS ABABA

Aynalem Yemane [1], Abate Yeshidinber [2]

[1] Department of Pediatrics & Child Health, College of Medicine and Health Sciences, Arbaminch University
[2] Department of pediatrics and Child Health College of Medicine and Health Sciences, St. Paul hospital millennium medical college
Corresponding author: Aynalem Yemane, aynyemane@gmail.com

ABSTRACT

Background : *Birth trauma is a common cause of neonatal morbidity and admission to Neonatal Intensive Care Units (NICU). Though asphyxia together with birth trauma remains among the 10 major causes of neonatal mortality in developing countries, there is limited data in Ethiopia.*

Objective : *To assess the prevalence and outcome of birth trauma in neonates admitted to Saint Paul's Hospital Millennium Medical College (SPHMMC).*

Methods : *Data were collected retrospectively from January 01- Jun 30, 2017 in the NICU of SPHMMC. All term neonate admitted to the NICU during the study period were included in the study. Data was analyzed using SPSS version 20 and logistic regression was done to determine associated factors with birth trauma.*

Result : *A total of 717 neonates were included in the study. The prevalence of birth trauma was 12.3%. The most common birth trauma was subgaleal hemorrhage (SGH) 68 (77.3%) followed by soft tissue injury7 (7.9%) and cephalhematoma 6(6.8%). Factors associated with birth trauma were instrumental delivery, malpresentation and long distance (>25km) from the hospital. Elective caesarian section (C/S) and low birth weight (LBW) were protective. Death occurred in 11% of newborns with birth trauma with intractable shock and asphyxia causing half (5 (50%)) of the deaths.*

Conclusion: *Birth trauma was a common problem in our setting with significant morbidity and mortality and deserves due attention to prevent its occurrence and complications.*

INTRODUCTION

Birth trauma is defined as organ or tissue damage as a result of physical pressure during the process of delivery. It doesn't include injury which occurred due to hypoxia and it may be avoidable or unavoidable (1).

Based on International Statistical Classification of Diseases-10 (ICD-10) birth trauma is classified as Intracranial laceration and hemorrhage, Birth injury to scalp, Birth injury to skeleton, Birth injury to peripheral nervous system (PNS) and Other birth injuries (2).

In developed country birth trauma is no longer listed in the 10 most common causes of death in the neonatal period due to the improvement in obstetric care and the increased use of cesarean deliveries over difficult vaginal deliveries. (1, 3).

But it remains among the most common cause of neonatal morbidity and mortality in

developing countries. Eighty percent of neonatal deaths are due to prematurity, infection, asphyxia and birth trauma. Asphyxia and birth trauma together accounts for 23% of neonatal mortality (4). Birth trauma alone is estimated to cause 5 to 8 newborn deaths per 100,000 deliveries (5).

Reduction of birth trauma is one of the components of Sustainable Development Goals 3 (SDG 3) (6). Knowing the prevalence and associated factors of birth trauma helps to put ways of early detection and implementation of appropriate treatment. Since there is limited study conducted in the past with regard to birth trauma in our country (only one study which is done 10 years back) our study added more recent and additional information on the subject matter.

Objectives

The study was conducted to determine the prevalence, types of birth injury, outcome and associated factors with birth trauma in term neonates admitted to SPHMMC NICU.

Methodology

The study was done in St Paul's Hospital Millennium Medical College which is located in Addis Ababa, one of the largest hospitals in the country with 392 beds, and an annual average of more than 200,000 patients. The NICU was established 12 years back and currently has 36 beds with average monthly admission of 229 newborns.

Data was collected from July/ 01/2017- August /01/2017 using pre-tested structured questionnaires focusing on socio-demographic, maternal reproductive history, and types of neonatal trauma and outcome.

All term neonates who were admitted during the month of January/1/ 2017 to June/30/ 2017 and who fulfilled the inclusion criteria were included in the study. Data from the hospital record showed that a total of 1778 neonates were admitted during the study period and out of them 756 were term neonates. Among 756 term neonates only 717 were included in the study excluding the thirty-nine neonates because of incomplete data.

Inclusion and exclusion criteria

All term neonates admitted to the NICU during the specified period were included. Cases were birth traumas which occurs during neonatal resuscitation, neonates with incomplete chart and bleeding from other causes other than birth trauma were excluded.

Data collection and analysis

Data was collected from the medical record of newborns admitted in the NICU during the study period. Data collectors were pediatrics residents working in the NICU. The diagnosis of the individual traumas was done by pediatricians working in NICU using ICD-10 for disease classification. Suspected intracranial hemorrhages and fracture of any site was confirmed by imaging reports. The principal investigator supervised the data collection and checked the completeness of the data collected daily.

Variables

The dependent variable is birth trauma while maternal age, Distance from the residence to

the hospital, Maternal parity, Maternal illness, Neonatal weight, Neonatal sex, Neonatal gestational age, Fetal presentation, Onset of labor, Duration of labor, Duration of rupture of membrane, Mode of delivery, and Place of Delivery were the independent variables.

Data processing & analysis

Data was entered in to SPSS version 20 after checked for completeness and coding of individual questionnaires. Frequency tables and graphs were used to describe the independent variables. Bivariate analysis was done to see the association between dependent and independent variables using the binary logistic regression. The variables with P value of 0.25 on the bivariate analysis were entered in the multiple logistic regression to control the effect of confounding variables and adjusted odds ratios (AORs) was used to explore the real association. A confidence limit of 95% and p- value less than 0.05 were used to determine significance.

Ethical consideration

The study was approved by the Institutional Review Board (IRB) of Saint Paul's Hospital Millennium Medical College (SPHMMC).

Result

Magnitudes and types of birth trauma.

Among the 717 deliveries 88 (12.3%) of them were identified to have birth trauma. Table 1.1 describes the sociodemographic character of the new born and delivery circumstances.

Eighty-one of the neonates had isolated trauma (92.1%) whereas 7 (8%) had mixed birth trauma. (Table 1.2) The most common site of birth trauma was scalp 76(86.4%), followed by soft tissue trauma 7(7.9%) and peripheral nerve palsy 5(5.7%). SGH is the most common type of birth trauma accounting 77.3% (68/88) of cases followed by cephalhematoma and facial congestion 6(6.8%) each. The least common birth trauma is bone fracture which occurred in 2(2.3%) of the neonates.

Two cases of facial nerve palsies had documented history of forceps delivery while 1 more facial nerve palsy case had caesarian section delivery. Out of 6 cases with facial congestion 5 of them had face/brow presentation.

Outcome of birth trauma

A total of 10 (11%) of the neonate with birth trauma had died. Complication occurs in 40 (45.5%) neonates. The two most common complications was anemia in 10(11.4%) and jaundice alone in 11(12.5%). Transfusion was required for 16(64%) of neonates with anemia. All neonates who died had SGH 10 (100%). Intractable shock and asphyxia were the leading cause of death 5 (50%).

The duration of stay in NICU of neonates with birth trauma was comparable to those without trauma with a mean of (3.64 ± 3.77 SD Vs 4.46 days' ± 3.11 SD, P value: 0.76).

Factors associated with birth trauma

Malpresentation, instrumental delivery and coming from far distance from the hospital were factors significantly associated with birth trauma. The odds of having birth trauma in neonates with brow and face presentation were 19.4 and 13.11 times respectively

to that of neonates with vertex presentation. The odds of having birth trauma in forceps and vacuum delivery is 7.9 (AOR 7.942, CI: 95%, 2.992, 21.085) and 29.2(AOR 29.232, CI95% 13.412, 63.709) than SVD. (Table 1.3). Elective C/S and LBW were shown to be protective against birth trauma as compared with spontaneous onset of labor and Normal birth weight (NBW)with AOR 0.12 (CI 95% .015, .969, Pvale:0.047) and 364 (CI 95% .133, .995, P value:.049) respectively. Since indication for C/S shows multicollinearity, it was not included in final model.

Discussion

Our study showed that the prevalence of birth trauma in SPHMMC was 12.3%, slightly higher than studies from Tikur Anbessa and Jimma university hospitals; 9% and 8.1% respectively (7,8) but significantly higher than reported in Iran 2.2% and India 1.5 % (9, 10). The discrepancy could be due to the different study design, study period and also the large sample size in both studies. The most common site of injury in this study was scalp trauma (86.4%). Linder I et.al; (63.9%) and Indian study also showed similar results (51.6%) (10, 11). The current study showed the most common type of birth trauma was SGH (77.3%). The Jimma study and Daniel H et al. identified similar result (7, 8). But other studies identified cephalhematoma as the commonest type (22.7%) in the Nigeria study and (57.2 %.) in the Iran study. This reason for the difference could be due to the relatively high prevalence of forceps delivery than vacuum delivery.

Table 1.1. neonatal characteristics and delivery features

Variables		Trauma (n=88)	No trauma (n=629)
Parity	Primi –para	49 (55.7)	330 (52.5)
	Multipara	39 (44.3)	299 (47.5)
Mothers age*	16-24	36(42.4)	254 (40.8)
	25-44	49 (57.6)	369 (59.2)
ANC follow up	Yes	85(96.6)	614 (97.6)
	No	3(3.4)	15(2.4)
Birth weight	Normal birth weight	81(11.3)	504(70.3)
	Macrosomia	1(0.8)	13(1.8)
	Low birth weight	6(0.8)	112(15.6)
Mode of Delivery	SVD	25 (28.4)	330(52.5)
	C/S	23(26.1)	254(40.4)
	Forceps	8(2.5)	16(9.1)
	Vacuum	30(34.1)	16 (2.5)
Place of delivery	SPHMMC	64(72.7)	436 (69.3)
	Health center	16(18.2)	138 (21.9)
	Other hospital	8(9.1)	43(6.8)
	Home	0	12(1.9)

*Age of 9 mothers were not documented on the Charts.

Table.1.2 Types of neonatal birth trauma

Types of birth trauma	Number	Percentage in all birth trauma	Percentage in study population
Trauma to the SCALP			
Subgaleal hemorrhage	68	77.3%	9.5%
Cephalhematoma	6	6.8%	0.8
Bruising to the SCALP	2	2.3%	0.3
Intracranial hemorrhage	4	4.5%	0.6
Skeletal fracture			
Femur fracture	1	1.1%	0.1
Skull fracture	1	1.1%	0.1
Peripheral nerve injuries			
Erb's palsy	2	2.3%	0.3
Facial nerve palsy	3	3.4%	0.4
Soft tissue traumas			
Facial congestion	6	6.8%	0.8
External genitalia injury	1	1.1%	0.1

Table1. 3. bivariate and multiple logistic regression analysis of factors associated with birth trauma

Variables		Birth trauma		P:value	AOR(95%CI)	P value
		No (%)	Yes (%)			
Residence from hospital*	<5km	211(33.6)	21(23.9)		Reference	
	5-25km	212(33.8)	26(29.5)	0.49	1.611(.789,3.29)	0.190
	>25km	205(32.6)	41(46.6)	0.015	1.996(1.027,3.8)	0.042
Fetal presentation	Vertex	597(92.7)	77(87.5)		Reference	
	Breech	37(5.9)	3(3.4)	0.426	.701 (.085,5.792)	0.742
	Face	7(1.1)	6(6.8)	0.001	13.11(3.8, 44.25)	<0.001
	Brow	2(50)	2(50)	0.044	19.41(2.03,185.9)	0.010
Birth Weight	NBW	504(80.1)	81(92.0)		Reference	
	Macrosomia	13(2.1)	1(1.1)	0.481	.541(.046, 6.377)	0.625
	LBW	112(17.8)	6(6.8)	0.02	.364 (.133, .995)	0.049
Mode of delivery	SVD	330(52.5)	25(28.4)		Reference	
	Forceps	16(2.5)	8(9.1)	<0.001	7.94(2.992,21.08)	<0.001
	Vacuum	16(2.5)	30(34.1)	<0.001	29.23(13.41,63.7)	<0.001
	Assisted	13(2.1)	2(2.3)	0.368	3.988(.288,55.19)	0.302
	Breech C/S	254(40.4)	23(26.1)	0.553	1.867(.967, 3.603)	0.063

In our study the rate of Vacuum delivery is 34.1% where as in the Nigeria it was (4.5 %) (5).

The present study showed that malpresentation like brow and face presentation had significant association with the risk of birth trauma which is consistent with Nibras et al. and the India study (10, 12).

Forceps delivery is associated with 7.9 and Vacuum delivery 29 times with birth trauma which correlates with that observed by the Bombay study 19.3% and 6.4% following forceps and vacuum respectively (13). It also showed that elective C/s was protective from birth trauma. This result is also consistent with Linder L et al (11).

Mothers who came from far distance from the hospital (>25km) had 2 times risk of giving birth to injured neonate. The finding is comparable to the study done at Netherland which showed Women who travelled 20 minutes or more had a significantly higher risk of intrapartum and early and late neonatal mortality (14).

Our study included distance from the residence to hospital and data was collected by pediatrics resident who are capable of identifying birth trauma and its complication which increases the reliability but incomplete data was the main limitation as it was a cross -sectional study.

In conclusion, the prevalence of birth trauma was 12.3%. The most common type of birth trauma is SGH followed by soft tissue injury and cephalhematoma. The risk factors identified includes instrumental delivery, (p: value: < 0.001), Malpresentation face (p Value< 0.001) and brow presentation, (P: value< 0.01) and Long distance >25km from the hospital (P: value 0.04). Elective C/S and LBW were found to be protective factors against birth trauma.

Safer way of delivery like caesarian section should be implemented in those who have higher risk for birth trauma. We recommend additional study to assess the technical skills and adequacy of training of personnel doing operative vaginal delivery.

REFERENCES

1. G.Akangire and B.Carter. Birth Injuries in Neonates. Pediatrics in Review 2016; 37(11):451-460.
2. International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10)-WHO Version 2016; 17:10-15.
3. Richard J, Avory A. Birth Injuries.Michele C. Henry H. , Bhagya L. Fanaroff and Martin's neonatal and perinatal medicine disease of the fetus and infant. Elsevier 2011, 501-527
4. Global Burden of disease. WHO 2004. 6
5. A Fabamwo, E Disu, O Akinola, L Adewale, L Adewole. Birth Trauma in A Tertiary Maternity Unit In South Western Nigeria. The Internet Journal of Pediatrics and Neonatology. 2006; 7 (2): 1-5
6. Transforming our world: The 2030 agenda for Sustainable Development A/res/70/1. 5
7. Daniel H, Bogale W. Birth trauma among live born term neonates at referral hospital in Addis Ababa, Ethiopia.Ethiop.Med J,2006;44(3):231-236
8. Workneh T, Netsanet W, Eshetu G. Birth injury and associated factors in Jimma University specialized hospital southwest Ethiopia; Ethiop.J pediatr.Child health, 2016;12(1)
9. Masoumeh A, Ahmad T, Mohammad J, Elaheh M, Mahdi M. Incidence of Neonatal Birth Injuries and Related Factors in Kashan, Iran.Arch Trauma Res. 2015;4(1):e22831:1-5
10. Somosri R, Rakesh M, Moumita S , Avijit H, Tapas K, Arijit D et al. Prospective study of birth trauma: Indian perspective; Journal of clinical neonatology 2016: 5(2): 91-5. 8
11. Linder N, Linder I, Fridman E, Kouadio F, Lubin D, Merlob P, et.al; Birth trauma, risk factors and short-term neonatal outcome.
12. Nibras H. Hussain, Adel Obaid Sege; Risk Factors of Birth Trauma of New Born Babies in Baghdad Teaching Hospital; Mustansiriya Medical Journal Volume 2014;13(1) June 2014:45-48.19
13. Charusheela W, Sushma M, Manish C, Ashwin S. Birth Injuries - A Review of Incidence, Perinatal Risk Factors and Outcome; Bombay Hospital Journal, 2012; 54 (2): 202-208
14. Ravelli AC, Jager KJ, de Groot MH, Erwich JJ, Rijninks-van Driel GC, Tromp M, Eskes M, Abu-Hanna A, Mol BW.Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands. BJOG, 2011;118:457–465