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PROPORTION OF BIRTH TRAUMA ANDASSOCIATED FACTORS AMONG Neonatesadmittedto Neonatal Intensive Care Unit In Tibebe Ghion Specialized Hospital, Amhara Region, North West Ethiopia.

BY: - Dr. Aklilu Worneh (PCH YEAR 3 RESIDENT)

ARESEARCH THESIS SUBMITTED TO DEPARTMENT OF PEDIATRICS AND CHILD HEALTH, SCHOOL OF MEDICINE, COLLEGE OF MEDICINE AND HEALTH SCIENCES IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF SPECIALITY INPEDIATRICS AND CHILD HEALTH.

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Study period	SEP, 1, 2024 to jan30, 2025.
Project area	Proportion of Birth Trauma and Associated Factors Among Neonates Admitted To Neonatal Intensive Care Unit In TibebeGhion Specialized Hospital, Amhara Region, North West Ethiopia.

DECLARATION

This is to certify the thesis entitled with 'proportion of birth trauma and associated factor among neonates admitted to TGSTH in Bahir Dar city North West Ethiopia'. Across sectional study done in 2025 and submitted for partial fulfillment of specialty certificate for pediatrics and child health at Bahir Dar University, is the record of my original work has never been summited to this or other institution to obtain any other degree or certificate. The help I received during the course of this investigation has been acknowledged."

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Abstract

Background: Neonatal birth trauma is the functional or structural damage of the new-born during child birth. Birth trauma is the major cause of neonatal mortality and morality in developing country though dramatically declined in developed world. And data's are limited in the area, Tibebe Ghion specialized hospital North West Ethiopia, leading to do the research.

Objective: to assess the proportion of birth trauma and associated factors among neonates admitted to neonatal intensive care unit in Tibebe Ghion Specialized Hospital, Amhara Region, North West Ethiopia, and 2024.

Method: Institutional-based cross-sectional study design was done from Sep, 1, 2024 to Jan 30, 2025at Tibebe Ghion Specialized Hospital. Total of 222 mother newborn pairs included in the study using systematic random sampling technique. Entered using Epi-Data version 4.2 and exported to SPSS version 27 for analysis. Logistic regression analysis was conducted to see the association between the dependent and independent variable.

.**Results:** Total of 222mother newbornpairs involved with response rate 100%. Among those, 29 newborns, 13.1 %(95%CI: 8.9-18.2) experience birth trauma. From those caput succedaneum accompanies 27.6%followed by SGA 24.1% cephal hematoma 20.7%,the list were humeral fracture and femoral fracture with equal frequency 3.4%.The most determinant factors are fetal weight greater than 4kg(AOR:7.36 95% CI:1.9-2.78),fetal presentation other than Vertex(AOR:3.195%CI:1.56.6) and prim parity(AOR:4.4.95%CI:1.4-14).

Conclusion and recommendation: In this study the prevalence of birth trauma is 13.1%which is high eventhouhg lower than the previous research done in Ethiopia and the most important factors were fetal macrosomia, malpresntation and vacuum primiparity. So, proper ANC, delivery follow up and proper intervention during labour are highly emphasized at hospital as well as MOH level.

Key words: Birth Trauma, TGSH, Ethiopia.

Acronym or Abbreviations

EPI-data	Epidemiological Data
FHR	Fetal Heart Rate
NICU	Neonatal Intensive Care Unit
PCH	Pediatrics and Child Health
SPSS	Statistical Package for Social Science
TGSH	TibebeGhion Specialized Hospital
SGH	Subgaleal Hemorrhage
ICH	Intracranial hemorrhage

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1. Introduction

1.1 Background

Birth trauma is defined as an impairment of the neonate's body function or structure due to an adverse event that occurred at birth. These traumas include a wide range of minor to major traumas due to various mechanical forces during labour and delivery[1].Amniocentesis and intrauterine transfusions can cause injuries before birth, and therefore are not considered as birth injuries. The injuries following neonatal resuscitation procedures are also not classified as birth injuries. Some injuries can take place from use of foetal scalp electrodes and intrapartum heart rate monitoring and are characterized as birth injuries[2].

Birth injuries are a diverse set of traumas afflicting a new-born during labour and/or delivery. These range from temporary paralysis to hematomas[3]. Reported international rates of posttraumatic stress disorder due to birth trauma range as high as 5.9%. Trauma associated with perinatal events, however, is often lacking in discussions of women's trauma[4].

Self-assessment is often used in order to initiate change efforts by investigating the status to question and comparing it to standards and goals. It is a comprehensive, systematic and regular review of an organization’s results and activities in order to discern strengths and weaknesses and plan for improvement actions to be monitored for progress[5].

To prevent and improve survival of birth trauma, different interventions have been implemented which need huge financial capacity. Some of the interventions include immediate intensive care unit and long term complex health need cares. These interventions lead to a huge economic burden for the family and the community at large through implementations of policies, strategies and programs [6-8].

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1.2. Statement of the Problem

Globally, the incidence of neonatal birth trauma varies based on mode of delivery, fetal presentation, and fetal position, and is reported to be between 0.2 and 41.2 per 1,000 births [9]**.**Severe birth trauma can be life-threatening, but early diagnosis and treatment increases the rate of survival. The risk factors for birth trauma were; premature rupture of membranes, instrumental delivery, birth weight, gestational age, induction of labor, and academic degree of attendant physician at delivery as the most significant risk factors for birth trauma[10].

The overall incidence of birth trauma in most developed countries has drastically declined due to improvements in obstetric care and prenatal diagnosis[11].However, in resource-limited settings including Ethiopia, the prevalence of neonatal birth trauma remains unduly high[12]. In Ethiopia, birth trauma and asphyxia could contribute for about 31.6% of neonatal deaths [13]. Moreover, there was a paucity of data concerning neonatal birth injury, particularly in North West Ethiopia.

As I have observed in my clinical practice , neonates having birth trauma admitted in TibebeGhion Specialized Hospital during the neonatal period, some of them were dyeing and those who survive were suffer from consequence of birth trauma like breathing difficulties, feeding problems, cerebral palsy, mental retardation, visual and hearing impairment. Therefore, the major aim of this study is to assess the proportion and to identify factors associated with birth trauma inTGSH, North West Ethiopia.

1.3. Significance of the Study

The findings of the study will help health care providers to understand determinants of birth trauma and to focus how to prevent it. Furthermore, the findings from this study may help program managers, regional health officer, and other stakeholders to design appropriate interventions to reduce birth traumaand decrease newborn morbidity and mortality. If published, it will represent our context to abroad.

2. Literature Review

2.1. Magnitude of birth trauma

A prospective cross sectional study conducted in Iran, the incidence of birth trauma was 2.2%[14]. A study conducted in Ghana showed that the prevalence rate of brachial plexus birth palsy was 14.7% out of a total of three hundred and twenty cases reviewed over the study period in the Volta Regional Hospital with prevalence **3.**7%[15].According to the study conducted in Nigeria,caput succedaneum (22.2%) and sub conjunctiva hemorrhage (22.2%) were the most frequent injuries observed, while cranial nerve injury the least. One patient had multiple injuries (cranial nerve injury with fractures hummers)[16].

Across sectional study conducted in Cameron, among 14,284 newborns that were consulted from January 2003 to February 2014, 1.84% had birth injuries The main clinical presentations were obstetric brachial plexus palsy (70.6%), fracture of the clavicle (22.5%) and fracture of the hummers (4.80%[17]. Across sectional study conducted in governmental hospitals of Southwest Ethiopian showed that, the prevalence of neonatal birth injury was 16.7%[19].Across sectional study conducted in South Wollo public hospitals, northeast Ethiopia showed that, seventy-eight newborns (13.13%) had experienced birth trauma[18].

2.2. Maternal related factors;

A retrospective cross sectional study conducted in Cameron, the contributing factor for birth traumawasadvanced maternal age[17]. The study donein governmental hospitals of Southwest Ethiopian showed tha**t**, mothers with no formal education and mothers whose occupational status was unemployed were 2.52, and 2.40 times more likely to develop neonatal birth injuries than their counterparts, respectively. Maternal age within the age range of 25–34 years, were 6.68 times more likely to develop neonatal birth injury compared to those whose age was greater than 34 years[19].

2.3. Obstetrics related factors

The study done in Iran showed that, decreased fetal heart rate (FHR), fundal pressure, shoulder dystocia, vaginal delivery and induction of labor were predictors of birth trauma[14]. A study conducted in Cameron, the contributing factor for birth trauma were vaginal and instrumental delivery[17] . A study conducted in South Wollo public hospitals, northeast Ethiopia showed

that, Prolonged second stage of labor more than 2hr, vacuum delivery , forceps delivery ,presentation other than vertex and shoulder dystocia were risk factors of birth trauma[18].

The study done in governmental hospitals of Southwest Ethiopian showed tha**t**, predictors such as primiparity and with no antenatal care were 12.27, and 4.26 times more likely to develop neonatal birth injuries than their counterparts, respectively. Neonates delivered *via* instrumental delivery were 2.81 times more likely to develop neonatal birth injury compared to those neonates delivered through Cesarean section[19].

2.4. Neonatal relatedfactors:

The cross sectional study done in Iran showed that, male sex and neonatal weight were predictors of birth trauma[14]. According 4 yea prospective studies conducted in Nigeria, **a** total of 134 neonates were reviewed during the study period with majority 62.7% being males. The mean age at presentation was 65.2 ± 89.2 h (median 24 h) with prevalence rate of birth trauma 24 .1% [16].A cross sectional study conducted in Cameron themost contributing factor for birth trauma was macrosomia[17].A study conducted in South Wollo public hospitals, northeast Ethiopia showed that birth weight >4 kg were risk factors of birth trauma[18]. Study done south west government hospital shows abnormal length of the neonate is the risk for birth trauma[19].

3. Conceptual framework

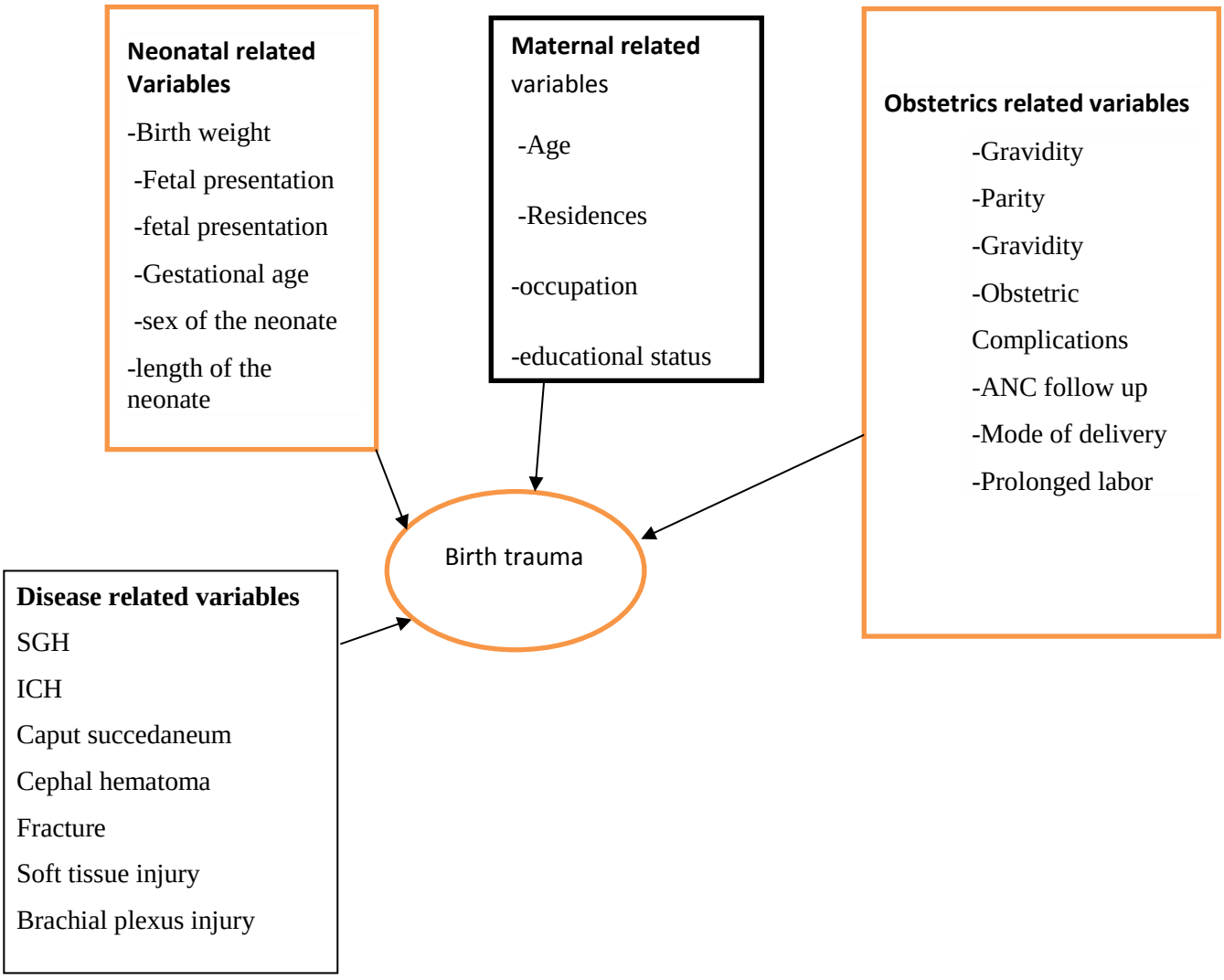

Figure 1Conceptual framework of birth trauma in Tibebe Ghion Specialized Hospital, 2025

4. OBJECTIVES

4.1. General Objective:

- To assess proportion of birth trauma and associated factors among neonates admitted to neonatal intensive care unit in Tibebe Ghion Specialized Hospital, Amhara Region, North West Ethiopia in 2025.

4.2. Specific Objectives

- To determine the proportion of birth trauma among neonates admitted at NICU in TGSH, Amhara Region, North West, Ethiopia in 2025.
- To identify factors associated with birth trauma among neonates admitted at NICU in TGSH, Amhara Region, North West, Ethiopia in 2025.

5. Method and materials

5.1. Study design and period

Institutional based cross-sectional study was conducted among neonates admitted to neonatal intensive care unit in TGSH, Amhara Region, North West Ethiopia from sep1st, 2024 to Jan 30th, 2025.

5.2 Study area

The study was conducted inTGSHwhich is found at Bahir Dar, North west Ethiopia from September to January. Bahir Dar, the capital of Amhara regional state which is located 565km away from Addis Abeba capital city of Ethiopia. The hospital commenced officially in 2019GC. It is located about 10km away from city center the high way to Addis Abeba. Currently, the hospital has more than 450 beds and gives for more than about 94000 clients as impatient and outpatient clinical service per year. The hospital has medical, surgical, gynecological, dermatology, ophthalmology, pediatrics and otolaryngology ward. Pediatrics and child health department has about 112 beds which includes ETAT, PICU, critical and stable ward, follow up OPD and NICU (neonatal intensive care unit) which has about 32 beds divided for preterm, term and kangaroo mother care. The care is delivered by pediatrician, residents and neonatal nurses.

5.3 Sources and Study population

Sources population

Sources population of these study was all neonates admitted to NICU in TGSH.

Study population

Study population of this study was all neonates admitted to NICU in TGSHduring the study period that fulfills inclusion criteria

5.4. Eligibility Criteria

5.4.1 Inclusion criteria

Neonates aged 0–28 days admitted to neonatal intensive care unit of TGSH during the study period.

5.4.2 Exclusion criteria

Neonates with incomplete data and neonates with severely ill mothers' were excluded from the study.

5.5 Sample size determination

sample size was determined using a single population proportion formula by considering the following parameters: $p = 16.7\%$[19].$z = 1.96$, $d = 0.05$ and CI = 95%, where, p = proportion of birth injury; z = probability of normal distribution; d = margin of error, and CI=confidence level. n=212. Using5% of the non-response rate, with total sample size (n) = 222.

5.6 Sampling technique

222 mother-neonate pairs admitted to NICU in the hospital during the study period was taken using the totalmother-neonatal pair's admissions at the hospital as a source population, which was 755. Using systematic random sampling technique, the sample was taken every 5 interval until we got the total sample sizen. (222)

5.7. Variable of the study

5.7.1 Dependent variable

Birth trauma (Yes=1, No=0)

5.7.2. Independent variables

Maternal related variables;

Maternal age

Residences

Maternal occupation,

Educational status

Obstetrics related variables;

Gravidity

Parity

Gravidity

Mode of delivery

Prolonged labor

ANC follow up

Obstetric complications

Neonatal related Variables;

Birth weight

Fetal presentation

Fetal length

Gestational age

Sex of the neonate

Disease related variables

SGH

Cephal hematoma

Caput succedaneum

ICH

Fracture

Brachial plexus injury

Soft tissue injury

5.8, Operational and Term Definition

Birth trauma: It is defined as functional or structural damage to the body of a new-born following labor/delivery (1).

Neonates: birth to 28 days inclusive (first four weeks of birth).

Macrosomia: Growth beyond a specific threshold (weight above 4000 g), regardless of gestational age

Gravidity: The number of pregnancy the mother had, it includes ectopic pregnancy, abortion, still birth and the current pregnancy.

Parity: The number of live births the mother had previously.

ANC follow up: A mother who meets a health care provider (midwifes, nurse, doctor) at list ones any of eight ANC schedules (19).

Obstetric complication: Any deviation from normal pregnancy, labor and delivery process (macrosomia, prolonged labour, malpresntation, instrumental delivery) (18).

Prolonged second stage of Labor: refers to labor that goes more than 2 hours after regular contractions begin and fully dilated cervix (18).

Abnormal length: length of the neonate greater than 90thpercentile for age (19).

5.9. Data collection tools and procedure

An interview administered structured questionnaire was adapted from reviewing different literature [14, 18, 23,24]. Data were collected using interviewer administrated structured questioner and document review checklist.

5.10, Data quality Control

The qualities of data were ensured before, during, and after data collection. Two days training wasgiven to the data collectors and supervisor on techniques of interview, communication skills during interview and on how to keep confidentiality. Before the actual data collection, pretest was done among 5 %(18) of the sample size in Adisalem primary hospital to ensure clarity and validity and then appropriate modification was taken based on the finding from the pretest. During data collection, data collectors were supervised closely by the supervisor. Finally, the collected data were checked for completeness, accuracy and clarity on the daily bases.

5.11. Data processing and analysis

Data were cleaned, coded and entered in to Epi-Data version 4.2 and exported to SPSS version 27 for analysis. Descriptive statistics like frequency and percentage were used to describe the characteristics of participants.

Crude odds ratio (COR) with 95% confidence interval had been used to estimate the association between each independent variables and outcome variable (birth trauma). Variables with p-value less than 0.2 in the bi-variable analysis were included in the multi-variable logistics model. Adjusted odds ratio with corresponding 95% confidence interval was computed in the multi-variable logistics model. P-value less than 0.05 was used to decide whether there is statistically significant between independent and outcome variable.

5.12. Ethical Consideration

Ethical clearance was obtained from institutional review board of Bahir dar University College of medicine and health science with protocol NO 3024/2024 and submitted to TGSTH administrative and got permission to conduct a research .Information sheet was prepared and read for all eligible participants. The purpose was explained to all .All the data obtained was kept confidential using codes instead of any personal identification. From participant, verbal informed consent was taken and explained as it is voluntary.

5 Results:

5.1Sociodemographyic characteristic of the mother and neonate

The study consists of 222 mother newborn pairs with participation rate of 100%. Of 222 study participants included in the study 52.3%of them were male, 47.7%were females. From those49.1% of newborn delivered from mothers living in urban area, 66.2% of the participants born from unemployed and 32.9%from who are not formally educated mother. Of them 34.9% of participants were delivered from mother's age beetwen20-35 years (table 1).

Table 1: Socio-demographic characteristics of the mother of study participants at TGSTH from Sep1-Jan30 2025

Variable	Category	Frequency	Percentage
Residency of the mother	Urban	109	49.1%
	Rural	113	50.9%
Age of the mother	<20 years	72	32.9%

	20-35 years	77	34.7%
	>35years	72	32.4%
Educational status	have formal education	149	67.1%
	No formal education	73	32.9%
Occupation of the mother	Employed	75	33.8%
	Unemployed	147	66.2%

5.2 Neonatal and obstetric characteristics

Majority of the study participants (48.2%) had normal birth weight betewen2.5-4kg, 8.6% were macrosomic, which is more than 4kg.among those under the study, 52.3% were term newborns and 11.7% were post term. Of the studied, 51.8% were delivered via vaginal delivery, 17.1%by vacuum and9.5% were forceps delivery. Most of the mother participated in the study (75.7%) had ANC follow up, 44.1% the participants' experienced obstetric complications with 38.3% duration of labor greater than 2hr and 35.1% non-vertex presentation (table 2).

Table 2: Neonatal and obstetric characteristics of study participants at TGSTH from Sep1-Jan 30, 2025

Variables	Category	Frequency	Parentage
Birth weight	<2.5kg	96	43.2%
	2.5-4kg	107	48.2%
	>4kg	19	8.6%
Sex	Male	116	52.3%
	Female	106	47.7%
Gestational Age	Preterm	80	36%
	Term	116	52.3%
	Post term	26	11.7%
Length of neonate	Normal	193	89.9%
	Abnormal	29	13.1%
Mode of delivery	Vaginal delivery	115	51.8%
	Vacuum	38	17.1%
	Forceps	21	9.5%

	Caesarean delivery	48	21.6%
Duration of labour	<2hr	137	61.7%
	>2hr	85	38.3%
Fetal presentation	Vertex	144	64.9%
	Non vertex	78	35.1%
Obstetrics complication	No	124	55.9%
	Yes	98	44.1%
ANC follow up	Yes	168	75.7%
	No	54	24.3%

5.3 Birth trauma characteristics

Among 222 new born participants 13.1% were experienced different forms of birth trauma. From those the commonest form of birth trauma (27.6%) was caputsaccedaneum followed by SGA (24.1%), cephal hematoma ((20.7%), soft tissue injury (16.1%), and the types of trauma with equal frequency, ICH (3.4%), femoral fracture (3.4%) and brachial plexus injury (table 3).

Table 3: Birth trauma characteristics of participants at TGSTH from Sep1-Jan30, 2025.

Variables	Category	Frequency	Percentage
Birth trauma	Yes	29	13.1%
	No	193	86.9%
Types of Birth trauma	SGH	7(24.1%)	24.1%
	Cephal hematoma	6(20.7%)	20.7%
	ICH	1(3.4%)	3.4%
	Caput succedaneum	8(27.6%)	27.6%
	Femora bone fracture	1(3.4%)	3.4%
	Humeral bone fracture	1(3.4%)	3.4%
	Brachial plexus nerve injury	1(3.4%)	3.4%
	Soft tissue injury	4(13.8%)	13.8%

5.4Factors Associated with birth trauma in Study Participants

On the bivariate logistic regression analysis, only five variables were eligible (p<0.25 to be analyzed by multivariate logistic regression(Table 4).Accordingly, based on parity, the presence of obstetric complications, weight of the neonate, fetal presentations and ANC follow up were eligible for multivariate analysis.

Study participants who are delivered from primiparous mother were (AOR=4.4, 95% CI ((1.45, 14), P=0.012) about 4.4 times affected by birth trauma than from neonates delivered from multiparous. On the other hand babies born with birth weight greater than4kg are (AOR=4(95%CI: 1.2-14.4), P=0.027) experienced birth trauma about 4times comparing to neonates whose birth weight is less than 2.5 kg.But neonates weighing 2.5-4kg at delivery (AOR =0.7(95%CI: 0.3-1.8), P=0.48) were about 3o% less developed birth trauma in comparison to low birth weight (<2.5kg).

The multivariate logistic regression showed that neonates who have fetal presentation other than vertex were (3.45.820, 95% CI (1.3, 7.9) p=0.01) 3.4 times experienced birth trauma than those normal vertex presentation. Moreover, participants born from mothers who have obstetric complications during delivery (AOR= 1.4, 9S%CI (3.75) p=0.41) are 1.4 times more likely to have birth trauma as compared to the mother who have no obstetric complications during delivery. Those study participants who delivered from who have no ANC follow up (AOR=2.4, 95% CI (0.99, 6.64) p=0.08) were 2.4 time to have birth trauma than those born from with no ANC follow up (table 4).

Table4: Bivariate and multivariate analysis to identify associated factors on neonatal birth trauma at TGSH Sep1-Jan30 (N=222), 2025.

Variables	Category	Birth trauma		COR((95%IC)	AOR(95%CI)	P –value
		Yes	No			
Number of	>2	4	81		1	

delivery	<2	25	112	4.5(95%CI:1.5-13.4)	4.4(95%CI1.4-14)	0.012*
Obstetric complications	No	11	113		1	
	Yes	18	80	2.3(95%CI:1.03-5.1)	1.4(95%CI:0.6-3.7)	0.41
Weight of the neonate	<2.5kg	13	83		1	
	2.5-4kg	9	98	0.6(95%CI0.23-1.44)	0.7(95%CI:0.3-1.8)	0.48
	>4kg	7	12	3.72(95%CI:1.2-11)	4(95%CI:1.2-1.14.4)	0.027*
Fetal presentation	Vertex	10	134		1	
	Non vertex	19	59	4.3(95%CI:1.9-9.8)	3.4(95%CI: 1.3-7.9)	0.01*
ANC follow up	Yes	16	152		1	
	No	13	41	3.01(95%cCI:1.3-6.7)	2.4(95%CI:0.99-6.4)	0.08

KEY 1 -indicates for reference group

5.5 Discussion

The incidence of neonatal birth trauma varies based on mode of delivery, fetal presentation and fetal weight, and is reported to be between 0.2 and 41.1per 1000 births (9). In the current study, the prevalence of neonatal birth trauma in Tibebe Gihonspecialized hospitals was 13.1% with 95% CI of (8.5, 18.2). This finding was found to be higher compared to the studies conducted in Iran, 2.2% (14), and Cameron 1.8 %(17). This might be due to the difference in the studied populations, different hospital infrastructure and human resource.

In contrast to these, the prevalence of neonatal birth trauma in this study was found to be lower compared to the studies conducted in South-East Nigeria, 24.0% (16), and in south west Ethiopia government hospital Ethiopia, 16.7 (19). The possible reason for this discrepancy might be due to the differences in the study setting, study design, infrastructure to the healthcare facilities, sample size, and the study period. For instance, four year prospective cohort study

design was used in a study conducted in South-East Nigeria (16), but in South west Ethiopia, multicenter cross sectional study design which includes primary hospital with low health care facilities but this study is in tertiary health care set up. Therefore, many years prospective study design may contribute to the increment of the neonatal birth trauma. In this study, fetal macrosomia, fetal presentation other than vertex is significantly associated with neonatal birth trauma. This was supported by studies conducted in south Wollo and Cameron as a cause birth trauma of (18).Regarding the sex of neonate, in our study, male neonates are affected by about1.5timescomparing with female which is supported by a study in Nigeria (16).Additionally in our study vacuum and forceps deliveries are associated to birth trauma about 1.4 times comparing to caesarean delivery supported by others study in south Wollo which is 2.8 time.

In this study, mothers with no history of antenatal care follow up were more likely to develop neonatal birth trauma. This is in agreement with a study conducted in south Wollo Ethiopia (18). This might be due to the fact that mothers with no history of antenatal care might not have any health related information including choice in place of delivery, birth preparedness and complication readiness plan, and early identification of risky pregnancy due to medical and obstetrical problems, which leads to causes fetomaternal complications and increases the risk of birth trauma. Neonates born to mothers who were not attending formal education and mothers who were unemployed had higher odds of developing neonatal birth trauma than their counterparts. This study finding is corroborated with the study conducted in south Wollo which was 12 and 4.2 times respectively, this might be due to the reason that women with formal educational status increase their job opportunities and income generation, which in turn helps mothers to visit health institutions.

In this study, parity was found to be a predisposing factor for neonatal birth trauma which corresponds to other study in Ethiopia (18). This result is explained by the fact that the pelvic joints and muscles of the birth canal of primiparous women were tight compared to multiparous women and this may exert undue pressure on the fetal presenting part during the labor process. In this study commonest type of birth trauma was caput succedaneum which accounts 27.6% that is nearly to the study in Nigeria which is 22 %(16).In other type of birth trauma ,brachia plexus injury occurred in 3.4%, paradoxical to the study in Cameron (70.6%).

Conclusion

The incidence of neonatal birth trauma in TGSH, Amhara Northwest Ethiopia hospitals is higher (13.1%). Fetal malpresntation, primiparity and fetal macrosomia were statistically significant with neonatal birth trauma. Instrumental deliveries, neonates delivered from mother who have no ANC follow up and from formally uneducated mother and male sex have also effect on birth trauma;eventhough not statically significant.

Recommendation

Birth trauma is one of the neonatal morbidity that can be reduced by meticulous neonatal care at delivery room and during operation procedures. Thus, health education dissemination about antenatal care services for reducing neonatal birth trauma should be improved. Training should be provided to medical staffs who attend laboring mothers regarding detecting abnormal progress in labor and also application of forceps and vacuum to assist vaginal delivery. Empowerment of women should be encouraged regarding education and health care services utilization. Primiparous women should also be well supervised during labor.

Limitations and Strengths of this study

This study was conducted at single tertiary hospitals, which increased the probability of generalizability among neonates admitted in NICU. Procedurally the study used a multivariate logistic regression analysis to control as many possible confounders as possible. Since this study was a cross-sectional study, it cannot show the cause and effect relationship of variables. .

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9. Appendix

Annex 1, information and Consent form;

Hello, my name is __. Dear participants, this questionnaire is prepared by Dr. Aklilu pediatrics and child health specialty graduating student in Bahir Dar College of medicine and health Sciences department of pediatrics and child health. Andhe wants to conduct a research about proportion of birth trauma and its associated factors among neonates admitted in NICU at TibebeGhion Specialized Hospital. From this study, no one is harmed, instead after completion of the study the finding will give useful information to our country. And for this work, I want your cooperation and your cooperation is essential, so I would like to ask you, to give your answers genuinely. Confidentiality of the information will be kept anonymously. There is no payment for your participation but we greatly thank for your participation and you have the right to refuse from participation at any time. This interview will take approximately 30–40 minutes.

Data collector name ……. signature……Date……..

Supervisor name …… signature……Date……

Annex 2, English version questionnaires

Part1. Socio-demographic characteristics mothers who gave birth at TibebeGhion Specialized Hospital Amhara Region North West, Ethiopia, 2024.

Number	Questionnaires	Responses
101	Where is your place of residences?	1. Urban 2. Rural
102	what is maternal age in years	1. <20 2. 20–35 3.>35
103	What is your educational status?	1.Formal education 2. No formal education
104	What is your occupation?	1.employed 2.unemployed
105	What is your number of pregnancy?	1 >2 2 <2
106	Number of delivery?	1 >2 2 <2
107	ANC follow up	1Yes 2 no
108	Any obstetric complication?	1.Yes 2.No

Part 2: Obstetrical and neonatal characteristics of mothers who gave birth at TibebeGhion Specialized Hospital, Amhara Region North West Ethiopia, 2024.

Number	Questionnaires	Responses
201	Neonatal birth weight	1.lowbirth weight (<2.5kg) 2.Normalbirth weight(2.5kg-4kg) 3.Large birth weight(>4kg)
202	Baby sex	1.Male 2.Female
203	Birth height (cm)	1.Normal 2.Abnormal
204	Gestational age (weeks)	1.preterm(<37 week) 2.term(37-42 week) 3.post term(>42week)
205	Mode of delivery	1.Spontauoues vertex vaginal delivery 2.vaccum delivery 3.Forceps delivery 4.delivery by caesarean section
206	Neonatal birth Injury	1.Yes 2.No
207	Presentation	1 Vertex 2 Non vertex
208	Duration of second stageof labor	1 <2hr 2 >2hr
209	Types of injury	1 SGH 2 Cephal hematoma 3 ICH 4 Caput succedaneum 5 Fracture specific site 6 humeral fracture 7 clavicular fracture 8 brachial plexus injury 9 Soft tissue injury 10 other….

Annex 3: Amharic version questionnaires

አባሪ፡- የመረጃ ገፅ እና አባሪ ስምምነት ቅፅ በአማረኛ

የመረጃ ገፅ

እኔ ዶ/ር------በባህር ዳር ዩኒቨርስቲ የመጨረሻ ዓመት የህክምና እጩ ሀኪም ነኝ፡፡ ዶ/ር አክሊሉ ወርቅነህ በባህር ዳር ዩኒቨርስቲ በህፃናት ትምህርት ክፍል የመጨረሻ አመት ሪዚደንት ተማሪ ሲሆን በህፃናት ላይ ጥናት እየሰራ ይገኛል፡፡ የጥናቱ አላማም በወልደት ጊዜ በአካል ላይ የሚደርስ ጉዳትና ምክንያቶችን በተመለከተ ይሆናል፡፡ በዚህ ጥናት ምንም አይነት የሚከሰት ጉዳት የሌለዉ ሲሆን ጥናቱም ለሀገር ጥሩ ፋይዳ ያለዉ ይሆናል ፡፡የጥናቱ ሂደት የበሽተኛ ሚስጥር በፍፁም የተጠበቀና ቃለ መጠይቁም ከ30 እስከ 40 ደቂቃ ብቻ የሚፈጅ ይሆናል፡፡ ለዚህም ቃለ መጠየቅ እንድትተባበሩኝ በትህትና እጠይቃለሁ፡፡

ጥናቱ የሚካሄድበት ቦታ ጥበበ ነግዮን ስፔሻላይዝድ ሆስፒታል

የአጥኝዉ ስምና ፊርማ ፡- ዶ/ር አክሊሉ ወርቅነህ

አድራሻ፡- +251900129070 (Email workake6@gmail.com)

የመረጃ ሰብሳቢዉ ስምና ፊርማ----------

የሶፐር ባይዘር ስምና ፊርማ----------

ክፍልአንድ፡- የእናትዮዋ ማህበራዊና ኢኮኖሚያዊ መረጃን በተመለከ

ተ.ቁ	መጠይቅ	መልስ
101	የእናትዮዋ መኖሪያ ቦታ	1.ከተማ 2.ገጠር
10	የእናትዮዋ እድሜ	1. 20 ዓመት በላይ 2. 20--35 ዓመት 3. ከ35 ዓመት በላይ
103	የትምህርት ደረጃ	1.መደበኛ ት/ት የተማረች 2.መደበኛ ት/ት ያልተማረች
104	የእናትዮዋ የስራ ሁኔታ	1.ስራ ያላት 2..ስራ የሌላት
105	ስንተኛ እርግዝናሽ ነዉ	1. ከ2 በላይ 2. ከ2 በታች
106	ስንተኛ ልጅሽ ነዉ	1. ከ2 በላይ 2. ከ2 በታች
107	ቅደመ ወሊድ ክትትል ነበረሽ ወይ	1.አዎ 2.የለኝም
108	በዚህ እርግዝና እና በወሊድ ጊዜ የተፈጠረ ችግር (ጠንቅ) ነበረ ዎይ	1.አዎ 2.የለም

ክፍልሁለት፡- የእናትዮዋን የወሊድ እና የህፃኑን ጉዳይ በተመለከተ

ተ.ቁ	መጠይቅ	መልስ
201	የህፃኑ ክብደት	1.ከ2.5 ኪ.ግበታች 2. ከ2.5 --4ኪ.ግ 3.ከ4 ኪ.ግ በላይ
202	የህፃኑ ፆታ	1.ወንድ 2.ሴት
203	የህፃኑ እርዝመት	1.የተመጣጠነ 2.ከመጠን በላይ
204	የህፃኑ የእርግዝና እድሜ	1.ያለ ጊዜዉ የተወለደ 2.በጊዜዉ የተወለደ 3.ጊዜዉ አልፎ የተወለደ
205	የወሊድ አይነት	1.በማህጸን አምጣ 2.በቫኪዉም 3.ፎርሴፕስ 4.ቀዶ ህክምና
206	የህፃኑ አመጣጥ	1.በጭንቅላቱ 2.ከጭንቅላቱ ዉጭ
207	የሁለተኛዉ ደረጃ ምጥ ስንት ሰዓት ቆየ	1.ከ2 ሰዓት በታች 2.ከ2 ሰዓት በላይ
208	ህፃኑ ላይ የተከሰት ጉዳት ነበር ዎይ	1.አዎ 2.የለም
209	የህፀኑ የጉዳቱ አይነት	1.ሰብጋሊያል ሄሞሬጅ 2.ሴፋል ሂማቶማ 3 በጭነቅላት ዉስጥ ደምመፍሰስ 4.ካፑት ሳክሲደነም 5.የጭን አጥንት መሰበር 6.ሂዉመራል ፍራክቸር 7.የትክሻ አጥንት መሰበር 8.ብራኪያል ፕሌክሰስ ኢንጁሪ 9.የለስላሳ ቲሹ ጉዳት 10.ሌሎች----------

አመሰግናለሁ!!!