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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH

SHORT TERM OUTCOMES AND CAUSES OF PERINATAL ASPHYXIAAT FELEGEHIWOT COMPREHENSIVE SPECIALIZED HOSPITAL IN BAHIR DAR; ETHIOPIA.

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Abbreviations and acronyms

PNA:	perinatal asphyxia
NNPD	national neonatal perinatal data bas
NICU:	neonatal intensive care unit
HIE:	hypoxic ischemic encephalopathy
WHO:	world health organization
BBA:	birth at ambulance(delivery while mother went to hospital)
FHCSH:	felege hiwotcomprehensive specialized hospital
LMIC:	low and middle income countries
APGAR:	appearance, pulse, grimace, activity/muscle tone, respiration
AAP:	American academy of pediatrics
ACOG:	American college of obstetrics and gynecology
BW:	birth weight
LBW:	low birth weight
VLBW:	very low birth weight
GDM:	gestational diabetes mellitus
EDHS:	Ethiopian demographic health survey
MDG:	millennium development goal

Abstract

Background: Birth asphyxia is a failure to initiate and sustain breathing at birth. Birth asphyxia can lead to severe hypoxic organ damage to heart, lungs, liver, gut, kidneys, but brain damage is the concern, because mostly not totally reversed to its pre-event function. But there is a gap to know short term outcomes of perinatal asphyxia in FHCSH.

Objectives: To assess short term outcomes and causes of perinatal asphyxia among neonates admitted to FHCSH.

Methods: Institution based cross sectional study was used on 314 neonates admitted to FHCSH, from September, 2017 to February, 2019 G.C. The data was collected on October, one to ten, 2019. The whole population admitted to the hospital was included in the study. Chart review was done for each consecutive case by using the already adapted checklist.The data was coded and entered to the SPSS 20 version and basic descriptive stastical analysis was done.

Result: there were a total of 314 perinatal asphyxia cases were admitted to the hospital in the study period. Death rate was high in this study 101(32.2%) from all studied subjects. Neonates with sarnat clinical stage III perinatal asphyxia has poor prognosis with 27(31%) survival rate and 5(38.4%) of survivors discharged with sequelae, while Good short term outcome was seen in cases with sarnat clinical stage I with 100% survival and discharged without sequel. Most perinatal asphyxia cases were labelled as stage II 208(66.2%) in this study. Most mothers were gave birth via SVD 193(61.5%) and also males were mostly affected 192(61.1). Most of the study subjects were term 270(86%) and 218(69.4%) cases having NBW.

Conclusion: the mortality rate of perinatal asphyxia was high. In this study mortality is associated with sarnat and sarnat clinical staging, complications of perinatal asphyxia, prematurity, home delivery and BW less than 2500grams.Therefore it is better to prevent perinatal asphyxia rather than treating after as well as preventing premature delivery and also prevent it's complication.

Key words: perinatal asphyxia, short term outcome, causative factors of perinatal asphyxia

Chapter one

1. Introduction

1.1 Background

Birth asphyxia is a failure to initiate and sustain breathing at birth. It also can be defined as placental or pulmonary gas exchange impairment leading to hypoxemia and hypercarbia. Birth asphyxia is oxygen deficit at delivery which can lead to severe hypoxic organ damage like heart, lungs, liver, gut, skin, kidneys, but brain damage is the concern, because mostly not totally reversed to its pre-event function.(1)

It is a multi-system organ dysfunction, which is characterized by metabolic acidemia (pH<7), APGAR score of <7 for longer than 5 min and neurological manifestation. Hypoxic ischemic encephalopathy (HIE) is a possible cause of permanent brain injury, which results death early and later resulted to developmental delay (DD), mental retardation and cerebral palsy (CP).(2-5).

The criteria to diagnose perinatal asphyxia according to American Academy of Pediatrics (AAP) and American College of Obstetrics (ACOG) umbilical cord arterial pH <7 is difficult to fulfill in resource limited areas, so predominantly diagnosis and staging based on APGAR scoring at 5-min of <7; or absence of baby crying immediately afterbirth was used.[7] . NNDP defines perinatal asphyxia moderate Slow/gasping breathing or an APGAR score of 4 to 6 at 1 minute, Severe PA: No breathing or an APGAR score of 0-3 at 1 minute of age. WHO defines Failure to initiate and sustain breathing at birth. The severity of perinatal asphyxia was classified as mild if the APGAR score is 6 or a history of that baby required only suctioning/stimulation to establish strong cry. Moderate perinatal asphyxia is APGAR score of 4–5, or a history of the neonate who needs stimulation and oxygen administration prior to crying. But severe perinatal asphyxia is manifested by APGAR score of 0–3 or a history of the baby who needs major intervention and the newborn is also comatose or floppy.(6)

Asphyxia can occur due to maternal heamodynamic compromise (amniotic fluid embolus), uterine conditions or placenta and umbilical cord related problems and infection, inadequate antenatal care for high risk pregnancies, intra-partum complications, and inadequate care during

labor and delivery. The asphyxia can occur prior to the onset of labor, intra partum or can occur immediately following birth (7-9). Hypoxic ischemic encephalopathy affects the tissues of the body and can lead to permanent brain damage and results from lack of oxygen and blood before, during or after birth.(10)

Birth asphyxia and the number of babies, who require resuscitation at birth at the global level were 10 million, (5%-10%)respond to simple stimulation to initiate breathing effort, 3% to 6% require basic resuscitation with bag and mask(6 million), and only less than 1% (<1 million) require advanced resuscitation (0.1% chest compression and 0.05% require drugs).(9)

The immediate result after perinatal asphyxia is either recover totally by the immediate intervention or death and/or presence of hypoxic ischemic encephalopathy (HIE) stage I, II or III, according to Sarnat and Sarnat staging(11, 12). The Outcome of birth asphyxia depends on APGAR score at 20minutes, heart rate at 90seconds, time to first breath, duration of resuscitation, arterial blood gases, and acid-base status at 10 and 30 minutes of age. (13)

1.2 Statement of the problem

There are a total of 136 million births per year globally, of these, about 1 million babies die of birth asphyxia is also causes near to 2.6 million third-trimester stillbirths. Apart from death it results equal number of serious neurological consequences ranging from mental retardation, epilepsy to cerebral palsy. Most of these deaths occur in lower and middle income countries (LMIC) where an estimated 4 to 9 million infants per year experience birth asphyxia, and only about 1 to 2 million are resuscitated successfully. Birth asphyxia contributes to 20% to 40% of all neonatal death.(14)This is a largest cause of under five mortality (8.5%), after pneumonia, diarrhea, neonatal infections and complication of preterm birth.

Birth asphyxia is a major cause of global mortality, contributing to almost one quarter of the global neonatal mortality (3 million neonatal deaths) and almost half of 2.6 million third-trimester stillbirths. Every year approximately 4 million babies are born asphyxiated; this results in 1 million deaths and an equal number of serious neurological consequences ranging from cerebral palsy and mental retardation to epilepsy.(15)

According to World Health Organization (WHO) estimates in the developing countries, 3% of all infants (3.6 million) suffer from moderate to severe birth asphyxia of which 23% (840,000) die and approximately the same number develop serious squeal.(16)

In developed countries birth asphyxia has reduced significantly and <0.1% newborn infants die due to it. In developing countries, rates of birth asphyxia are several fold higher, ranging from 4.6/1000 in cape town to 26/1000 in Nigeria and case fatality rate may be 40% or higher.(17)

In 2016 WHO shows neonatal mortality due to perinatal asphyxia and birth trauma were the second causes of neonatal death next to preterm related complications in Ethiopia.

In Ethiopia; neonatal mortality declined from 49 deaths per 1,000 live births at 2000to 29 deaths per 1,000 births in 2016 EDHS data, which is a reduction of 41% over this last 16 years, but the plan was reduced it by two third. From this we can see that the rate of neonatal mortality is not according to MDG.(18)The main cause of neonatal mortality is perinatal asphyxia 31.6%, followed by prematurity 21.8% and sepsis 18.5% according to UNICEF data 2015 in Ethiopia.

The Amhara national regional state, neonatal mortality according to 2000 EDHS data was 60 per 1000 live birth and at 2016 EDHS was 47 per 1000 live birth. Specifically neonatal mortality at FHCSH was 13.29% but the proportion of mortality due to perinatal asphyxia was not known(19),so there is shortage of data about short term outcomes and causes of perinatal asphyxia. Therefore this study will fill this gap by assessing short term outcomes and causes of perinatal asphyxia at the time of discharge/referral or until death among neonates who was admitted to FHCSH NICU on the study period.

1.3 Significance of the study

Despite the presence of high admission and mortality of neonates to FHCSH, there is no study which shows short term outcomes and causes of perinatal asphyxia. So the study is important for health professionals to know the outcomes of their intervention and also what was left to be improved for quality care, gaps to prevent perinatal asphyxia as well as to reduce prognostically causative factors, since it is preventable disease most of the time by increase institutional delivery, improving our health care quality during, ANC follow up, labor & delivery and also immediate neonatal care accordingly by skilled and effective resuscitation and also for different

managerial stake holders and policy maker to plan according to burden of the disease in this institution.

Chapter two

2. Literature review

2.1 Causes of perinatal asphyxia

2.1.1 Socio demographic factors;

There was retrospective case control study conducted for two years at Neonatal Intensive Care Unit of pediatric ward (I, II, III) and in Gynecology wards (I, II, III) of Civil Hospital Karachi, Dow University of Health Sciences, on 2014, G.C. Pakistan. Two hundred forty participants were involved in the study and from this 123 were cases and the rest was control. Mean maternal age for cases 24.22 ± 3.38 while for control 24.30 ± 4.04 years, premiparous as risk for birth asphyxia 70 (56.9%) as compared to normal 39 (33.3%) and low socio economic as a case 62 (50.4%).(20)

Hospital based un matched prospective case control study done at Gonder university hospital, on 2018, G.C. and a total of 270 (90 cases and 180 controls) were included in the study. The determinant factors were age of the mother 27.8 and 26.9 years, as a case and control respectively. The other was rural residency 39 (43.3%) and 32(17.8%) as cases and controls were respectively. Thirty-five (42.0%) of the cases and 38 (19.3%) of the controls had no formal education, while one-third (33.0%) of cases and half of (54.0%) the controls had secondary and above level of education and among the participants, 58 (64.5%) of the cases and 77 (42.8%) of the controls were housewives respectively.(21)

2.1.2 Health services delivery related causes

In Ethiopia there was institutional based cross sectional study conducted at Dilla university referral hospital, Jimma zone public hospital, General hospitals in Tigray region and Dilchora referral hospital, but at Gondar university referral hospital unmatched prospective case-control study was conducted; from these all institutions, meconium stained amniotic fluid, absent or incomplete ANC follow up, C/S delivery, prolonged 2nd stage of labor & total duration of labor

as well, induced labor, mal presentation and CPD are determinant factors which leads to perinatal asphyxia.(21-25)

2.1.3 Causes related to maternal and neonatal medical conditions

Observational study conducted at Dhaka medical college hospital, Bangladish; On Special Care Baby unit from October 2003 to March2004. To identify the risk they used retrospective comparison of the cases and controls. In the study outcome was analyzed by comparative cross sectional study. Medical conditions which result newborn prone for asphyxia was hypertension, maternal toxemia and APH. From the neonatal factors comparison to control cases are term, post term and multiple gestation.(26)

Institutional based study was done at Katihar Medical College ,India, from January 1, 2013 to December 1, 2013 and Kilimanjaro Christian Medical Center, Tanzania, from November 2014 to April 2015, shows determinants of medical factors in both studies are as follows; mild and moderate HIE have good prognosis but birth injury, hypotension, hypothermia, hypoglycemia, hypoxemia, low birth weight, stage III HIE are neonatal factors which are strongly associated with poor outcomes of perinatal asphyxia.(10, 16)

A cross sectional study was done, at Central Park Medical College, Lahore, at 2017 G.C.; to evaluate determinant factors and immediate outcomes of birth asphyxia. Sixty one patients were included in the study period. From these asphyxiated neonate 60.7% are SVD, and all the rest was via C/S. fifty three neonates were arrived within 6hrs and 11(18%) are home delivery. Of these stage I(39.3%), stage II(49%) and stage III(11.5%)hypoxic ischemic encephalopathy was seen respectively. Home delivery and HIE stage are strong determinants of outcome in this study otherwise there was no association seen between outcome at discharge and time of arrival to hospital.(27)

There was a prospective cohort study conducted at St.FrancisHospital, Nsambya, Kampala-Uganda, on 2018 G.C. To know the incidence and short term outcomes of neonates with HIE 751 cases were included in the study.3.3% have low APGAR score and intrapartum asphyxia evidenced by Ph<7 or base deficit >12. All neonates who have low APGAR score at 5th min develop HIE subsequently. In this study presence of APH , primi parity, referred mother and use of herbal medicine during labor has strong association to result HIE and it's complication.(28)

Among the institution based study done in Ethiopia at dire dawa ,dilla, jimma and tgray region; the determinant factors of perinatal asphyxia were Maternal anemia during pregnancy, chronic hypertension, pre-eclamsia, and low birth weight, APH, male gender, low birth weight and prematurity.(22, 24, 25, 29)

2.2 Outcomes of perinatal asphyxia;

The observational study done at Dhaka medical college hospital, Bangladish on baby care unit from October 2003 to March2004 and data was analyzed by comparison cross sectional study. Among the cases the neonatal outcome was related to the severity of asphyxia and associated medical problems. In this study hypoxic ischemic encephalopathy (HIE) was high and associated with mortality, 45% and 12% respectively, but others which were associated with mortality was convulsion, septicemia, apnea, respiratory distress, necrotizing enterocolitis, feeding intolerance and cardiac arrest were respectively with their frequency. Despite low proportion the mortality is strongly associated with prematurity in cases (66.6%). Overall mortality of the case was 16% and neurological squeal was 28%. But no neurological squeal or mortality seen in control group.(26)

There was a prospective hospital based study done at KandangKerbau women's and children hospital, Singapore; 23 neonates including in the study for 42 month period. Of those all needs mechanical ventilation, 16 neonate has seizure and hypotension and the other 10 neonate have hypoglycemia, persistent oliguria and respiratory distress. stage I, stage II and stage III were 8.7%, 52.2% and 39.1% respectively. The outcome was 9(39.1%) died, from these most were within one week 5(55.5%). The neurodevelopmental outcome for 14 survivors at 18 months were 6(42.8%) neurologic disability.(30)

There was institution based retrospective study was done at eastern Nepal, on2016 G.C. shows the determinant factors of perinatal asphyxia was like home delivery, hospital stay <72hours, neonatal shock at presentation and prematurity are significantly associated with mortality. Among those 48(16.8%), 136(47.7%), 63(22.1%) are stage I, stag II, stage III respectively. Among these 59(20.7%) are died during hospital stay.(31)

It animal studies(models), it shows that immature brain is more resistant to hypoxia-ischemia than the brain of the term neonate due to lower sensitivity to neurotransmitters of potential neurotoxicity, the greater plasticity of the immature brain and lower cerebral metabolic rate, so

term(mature) neonates are vulnerable to hypoxic ischemic encephalopathy,(32)but mortality is strongly associated with immature brain(prematurity) once they develop it.

In animal model studies done at USA, on 2011 G.C. Mostly males were affected and also has poor prognosis than matched females, these is due to the actions of X-linked inhibitor of apoptosis (XIAP) in females which is neuroprotective in females, in males there is caspase dependant path way is activated opposite to that, the second cause for males to be affected by HIE is the presence of testosterone modulate the risk for males at birth.(33)

The prospective institutional based study done at Tanzania shows, the short term outcomes of perinatal asphyxia was; abnormal neurologic findings like weak/absent reflexes, hypotonia and change in mentation was 46%, 43.3%,and 42.2% respectively. On the 7th post natal age 17.1% of neonate has no change from 1st evaluation. Mortality was associated with sever HIE and mortality rate was 9.1 % from the one who has HIE.(10)

There was Prospective Cohort study conducted between October 2015 and January 2016 at St. Francis Hospital, Nsambya, Kampala- Uganda. Seven hundred fifty one cases were included in the study, only 23 new borns were develop HIE. The majority, 10 (43.5%) had mild Hypoxic Ischemic Encephalopathy, followed by 8 (34.8%), 5 (21.7%) that had moderate and severe Hypoxic Ischemic Encephalopathy respectively. A total of (6) 26% died, and (15) 65.2% were discharged within 1 week.(28)

In Sokoto, Nigeria there was a retrospective data was collected from the medical record over 30 months from August 1, 2011, to February 28, 2014. At this time there was 1040 admission over the study period and 257 cases were reported as perinatal asphyxia. From these 216 (87.4%) were discharged without documented complication, while there was seven deaths (2.8%), of these 5(71.4%) were stage III HIE and eclamcia was strong associated factor.(6)

There was an analytical prospective study done from July2015 to June 2016 in the Newborn Special Care Baby Unit (SCBU) of Enugu State University Teaching Hospital, Nigeria a total of 150 cases were included in the study. Severity of asphyxia, LBW, prematurity and out born neonates had higher mortality. Overall mortality was 38.7% but 61.3% were discharged.(34)

Chapter three

3. Objectives

3.1. General objectives

To assess short term outcomes and causes of neonates admitted with the diagnosis of perinatal asphyxia at Felege Hiwot comprehensive specialized hospital neonatal ward, from September, 2017 to February, 2019 G.C.

3.2 Specific objectives

To determine short term outcome of perinatal asphyxia.

To identify causes of short term outcomes of perinatal asphyxia.

Chapter four

4. Methods and materials

4.1 Study setting and period

The study was conducted at FHCSRH which is found in Bahir Dar city. Bahir Dar city is the capital city of Amhara national regional state which is 565 km far from Addis Ababa, the capital city of Ethiopia. In the northwest direction, FHCSRH is the only one comprehensive specialized hospital in Amhara national regional state. It serves near to 17.2 million population(35) as a referral hospital, among these 2.3 million are under 4 yrs of age. The study was conducted from September, 2017 to February, 2019 G.C.

4.2 Study design

Cross sectional study was used.

4.3. Source population

All neonates with diagnosis of perinatal asphyxia who were admitted to FHCSRH to neonatal intensive care unit from September, 2017- february 2019 G.C.

4.4 Study population

All neonates with diagnosis of perinatal asphyxia who were admitted to FHCSRH to neonatal intensive care unit from September, 2017-february 2019 G.C

4.5 Illegibility

4.5.1 Inclusion criteria

All neonates who were admitted to FHCSH neonatal intensive care unit with the diagnosis of perinatal asphyxia on the study period.

4.5.2 Exclusion criteria

All neonates; pre term <34 weeks of GA, a neonate with clinical feature of any syndrome (like Down syndrome, Edward syndrome, pathausyndrome), neonate with life incompatible congenital malformation. Because in our set up we use clinical criteria to diagnose perinatal asphyxia rather than laboratory modalities, in addition the APGAR score is subjective and immaturity and chromosomal abnormalities may excaudate the result.

4.6 Sample size;

Since the study subjects were manageable and small, so, all neonates who were admitted to FHCSH neonatal intensive care unit with the diagnosis of perinatal asphyxia were included in the study. So total neonates admitted as a case in the study period were 324 but 314 were included, While others were not included in the study by exclusion criteria.

4.7 Study variables

4.7.1 Dependent variable:

- Short term outcomes of perinatal asphyxia.

4.7.2 Causal variables;

- Maternal socio demographic data: age, religion, address of the mother, marital status, educational status.
- Ante natal and delivery conditions: ANC follow up, parity, place of delivery, mode of delivery, onset of labor, duration of labor, duration of ROM, a professional who attend the labor,
- Maternal obstetric and chronic medical conditions: pre eclamcia, APH, chorioamnionities, RVI, DM, psychiatric illness.
- Neonatal socio demographic and medical conditions: GA, birth outcome, birth weight, age at admission, BW, sex, APGAR score, history of resuscitation, complications of perinatal asphyxia, secondary diagnosis at admission, investigation done, management given, duration of hospital stay, hospital outcome, condition at discharge, possible cause of death.

4.8 Operational definition

Perinatal asphyxia=failure to initiate first breath as well as to sustain breathing at birth/ APGAR score persistently <7 after 5minutes and/or didn't cry immediately after birth, if APGAR score was not known/ history of resuscitation.

Short term outcomes of perinatal asphyxia = the status of the neonate whether alive or death from the hospital.

An abnormal neurological examination at discharge/referral = any abnormalities in level of alertness, tone, neurological deficits or bulbar dysfunction, or discharged/referred with NGT feeding after one week.

4.9 Data collection tool and procedure

Check list was adapted from related articles to collect secondary data through chart review of the study subjects by three nurses who has previous experience. To assess short term out comes and causes of perinatal asphyxia and data was collected on October 1-10, 2019 G.C.

4.10 Data quality control

Pre data collection training was given for data collectors and supervisor. Supervision was done and difficulty of the checklists was checked and some correction was done based on the difficulty during data collection. The data was evaluated for its consistency and completeness during data entry.

4.11 Data analysis

The collected data was coded and entered into SPSS version 20 statistical software package. Basic descriptive statistical analysis was done, such as common causal factors of perinatal asphyxia, mortality, time of death, common complications of perinatal asphyxia in our set up frequency and percentage were done and was compare and contrast to other study.

4.12 Ethical approval

Ethical approval was obtained from Bahir Dar University Institutional Review board (IRB). Permission letter was written to FHCSH administrators and was communicated at each level of the department. All records were coded and accessed by the research team only to assure confidentiality.

4.13 Dissemination

The study was submitted to college of medicine and health sciences, department of pediatrics and child health. The research was presented at Bahir Dar University. It also will be presented at national and international conferences and also for FHCSH management board. Finally submitted to international journals for publication.

5. Result

5.1 Maternal Sociodemographic characteristics;

In this study a total of 314 asphyxiated neonates were included in the study. Majority of maternal age was b/n 25-29 years. One hundred ninety seven cases (62.7%) were came from rural areas. Regarding to religion most of the mothers were orthodox Christians 288(91.7%). Majority of the mothers were married 287(91.4%) of the total study group. Most of the cases could at least read and write 194(61.8%).

Table 1:distribution of maternal Sociodemographic characteristics at FHCSH from September 2017 to February, 2019 G.C.

Variables	Frequency	Percent
Maternal age(in years)		
15-19	7	2.2
20-24	109	34.7
25-29	122	38.9
30-34	52	16.6
35-39	20	6.4
40-44	4	
Residency		
Rural	197	62.7
Urban	117	37.3
Maternal religion		
Orthodox	288	91.7
Protestant	17	5.4
Muslim	7	2.2
Other	2	
Marital status		
Married	287	91.4
Unknown	25	8
Unmarried	2	

Educational status		
Literate	194	61.8
Illiterate	94	29.9
Unknown	26	8.3

5.2 Causes of perinatal asphyxia;

A. Maternal related causes;

Majority of the study subject didn't face maternal medical complications, even though 12.1%(38) mothers had obstetric complications and of this pre-eclamcia accounts 20(6.4%). Most of the mothers had no chronic medical illness, only two cases had one HIV and the other one was diabetes mellitus respectively. Mothers who took medication was 32(10.2%), of these MgSo4 was 20(6.4%).

Table 2; distributions of maternal medical related causes perinatal asphyxia at FHCSH from September, 2017 to February, 2019 G.C.

Variables	Frequency	Percent
Maternal obstetric complication		
Preeclamcia	20	6.4
APH	14	4.4
Chorioamnionities	6	1.9
Mother took medication		
Mgso4	20	6.4
Anti biotics	7	2.2
General an estesia	3	
Other's: HAART and insulin	2	

B. Antenatal, Labor and delivery causes of perinatal asphyxia;

Almost all mothers had ANC follow up 313(99.7%), of these 266(84.7%) were having follow up at health center. Mothers were para one 176(56.1%). Majority of labor had started spontaneously

291(92.7%). Prolonged rupture of membrane was seen for 26(8.3%) of mothers. Three hundred eight (98.1%) deliveries were at health institutions, out of which 193(61.5%) were SVD.Majority of labor was attended by midwives/nurses 202(64.3%). APH was rarely an indication of instrumental or C/S delivery 6(1.9%). The alive delivery outcome in most of the cases were singleton 305(97.1%).

Table 3;Antenatal ,labor and delivery related causes of perinatal asphyxia at FHCSH from September, 2017 to february, 2019 G.C.

Variables	Frequency	Percent
ANC follow up		
Yes	313	99.7
No	1	
Site of ANC follow up		
Health center	266	84.7
Hospital	47	15
Parity		
Primi para	176	56.1
Multi para	138	43.9
Onset of labor		
Spontaneous	291	92.7
Induced	13	4.1
Duration of labor		
<3hrs	11	3.5
3-24hrs	254	80.9
>/=24hrs	39	12.4
Rupture of membrane		
<18hrs	278	88.5
>/=18hrs	26	8.3
place of delivery		
Institutional	308	98.1

Home	5	1.6
Birth at ambulance	1	
Mode of delivery		
SVD	193	61.5
Instrumental	60	19.1
C/S	61	19.4
Labor was attended by		
Midwife/nurses	202	64.3
Gynecologist/ resident	90	28.7
TBA	5	1.6
IESO	17	5.4
Indications of instrumental or C/S delivery		
Obstructed labor	12	3.8
NRFHRP	25	8
APH	6	1.9
Others: previous C/S scar with PLFSOL, meconium stained amniotic fluid and prolonged 2nd stage of labor	78	24.8
Alive delivery outcomes		
Single	305	97.1
Twin	9	2.9

C. Neonatal socio demographic related causes of perinatal asphyxia;

Majority of the cases were male 192(61.1%) and were term 270(86%).

Table 4: Distributions of neonatal Sociodemographiccauses of perinatal asphyxia, from September, 2017 to February, 2019 G.C.

Variables	Frequency	Percent	Outcome variables	
			Alive	Death
Neonatal sex				
Male	192	61.1	134	58(30.2%)
Female	122	38.9	79	43(35.2%)
Gestational age				
Pre term	29	9.2	15	14(48.3%)
Term	270	86	189	81(30%)
Post term	15	4.8	9	6(40%)
Birth weight				
VLBW	3		1	2
LBW	53	16.9	31	22(41.5%)
NBW	218	69.4	153	65(29.8%)
LGA	4		3	1
UBW	36	11.5	25	11(30.6%)

D. Neonatal immediate post natal period causes and effects of perinatal asphyxia;

Most neonates 1st and 5th min APGAR score was b/n 4-7, 142(45.2%) and 154(49%) respectively. Around 124(39.5%) of neonates had no documented APGAR score, from those majority didn't cry immediately after birth 119(96%). One hundred forty nine (47.5%) neonates were resuscitated immediately after birth, of these 91(61.1%) were resuscitated for unknown duration. At admission most neonates had depressed neonatal reflex and develop stage II HIE 213(67.8%) and 208(66.2%) respectively. Only 24(7.6%) of asphyxiated neonates were complicated with NEC. Only 5 (2.8%) had needed triple anticonvulsants for seizure control.

Table 5;Neonatal immediate post natal period causes and effects of perinatal asphyxia from September, 2017 to February, 2019 G.C.

Variables	Frequency	Percent	Outcome variables	
			alive	death
1st min APGAR score				
</=3	44	14	27	17(38.6%)
4-7	142	45.2	101	41(28.9%)
>7	9	2.9	8	1
Unknown	119	37.9	77	42(35.3%)
5th min APGAR score				
</=3	3		1	2(66.7%)
4-7	154	49	105	49(31.8%)
>7	33	10.5	26	7(21.2%)
Unknown	124	39.5	81	43(34.7%)
Did the baby cry immediately after birth? If APGAR score was unknown.				
No	119	96	80	39(32.8%)
Yes	5	4	1	4
Resuscitated				
Yes	149	47.5	99	50(33.6%)
No	51	16.2	34	17(33.3%)
Unknown	114	36.3	80	34(29.8%)
If yes, for how long				
<5min	2		1	1
5-10min	19	12.8	13	6(31.6%)
10-20min	17	11.4	12	5(29.4%)
>/=20min	20	13.4	10	10(50%)

Unknown	91	61.1	63	28(30.8%)
Age at admission				
<6hrs	183	58.3	123	60(32.8%)
6hr-3days	85	27.1	53	32(37.6%)
>3days	46	14.6	37	9(19.6%)
Neonatal reflex at admission				
Intact	16	5.1	15	1
Depressed	213	67.8	172	49(23%)
Absent	85	27.1	26	59(69.4%)
Stage of HIE at admission				
Stage I	19	6.1	19	0
Stage II	208	66.2	167	41(19.7%)
Stage III	87	27.7	27	60(69%)
Complications of perinatal asphyxia				
Seizure	181	76	127	54(29.8%)
ARF	40	16.8	17	13(32.5%)
NEC	24	10	7	17(70.8%)
RDS	32	13.4	11	21(65.6%)
None	76	24.2	63	13(17.1%)
Secondary diagnosis				
MAS	92	29.3	55	37(40.2%)
SGH	57	18.2	38	19(33.3%)
Severe anemia	17	5.4	11	6(35.3%)
EONS	172	54.8	121	51(29.6%)
Management given				
Routine	33	10.5		
Routine, Ca gluconate & INO2/CPAP	8	2.5		
Routine & Ca gluconate	3			
Anticonvulsant	1			
Routine and INO2/CPAP	100	31.8		

Took the above all	169	53.8		
Need of anticonvulsant to Control seizure				
One	133	74	91	42(31.6%)
Two	32	17.7	24	8(25%)
Three	5	2.7	3	2
Duration of hospital stay				
<24hrs	44	14	3	41(93.2%)
1-7days	151	48.1	100	51(33.8%)
7-14days	74	23.6	68	6(8.1%)
14-28days	37	11.8	34	3
>28days	8	2.5	7	1

5.3 Short term outcome ;

Majority of neonates stayed in hospital for 1-7 days and was discharged from hospital 151(48.1%) and 162(51.6%) respectively. Among the admitted neonates death was 101(32.2%) and immediate cause of death was asphyxia 72(71.3%) and most neonates died within the 1st 72 hrs of life, 70(69.3%).

Table 6; Distributions of perinatal asphyxia and it's different outcomes, at FHCSH from September, 2017 to February, 2019 G.C.

Variables		Frequency	Percent
Condition at discharge, if discharged			
Improved		141	87
With disability		17	10.5
Unknown		4	
Neonatal outcome			
Alive	Discharge	162	51.6
	Left against medical advice	34	10.8
	Disappear	17	5.4
Death		101	32.2
Immediate Causes of death			
Sepsis		14	13.9
NEC		8	7.9
Asphyxia		72	71.3
Respiratory failure		7	6.9
Timing of death			
<24hrs		41	40.6
1-3days		29	28.7
4-7days		22	21.8
>7days		9	8.9

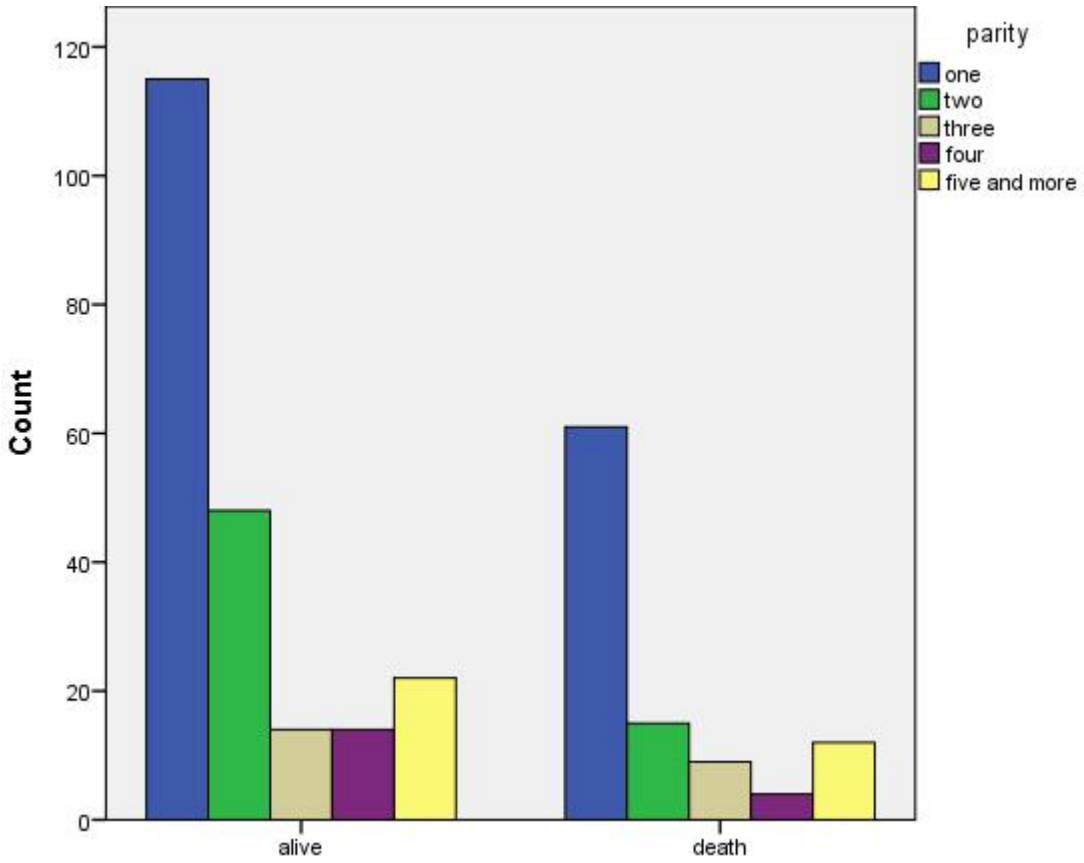

Figure 1; Distributions of parity versus short term outcome of perinatal asphyxia at FHCSH from September, 2017 to February, 2019 G.C. by bargraph.

Table:7;Distribution of health care provider attending labor versus short term outcomes of perinatal asphyxia at FHCSH from September, 2017 to February, 2019 G.C.

Short term outcomes		Deliverywasattendedby;				Total
		midwife/nurse	gynecologist/ resident	traditional birth attendant	IESO	
	alive	139	59	3	12	213
	death	63	31	2	5	101
Total		202	90	5	17	314

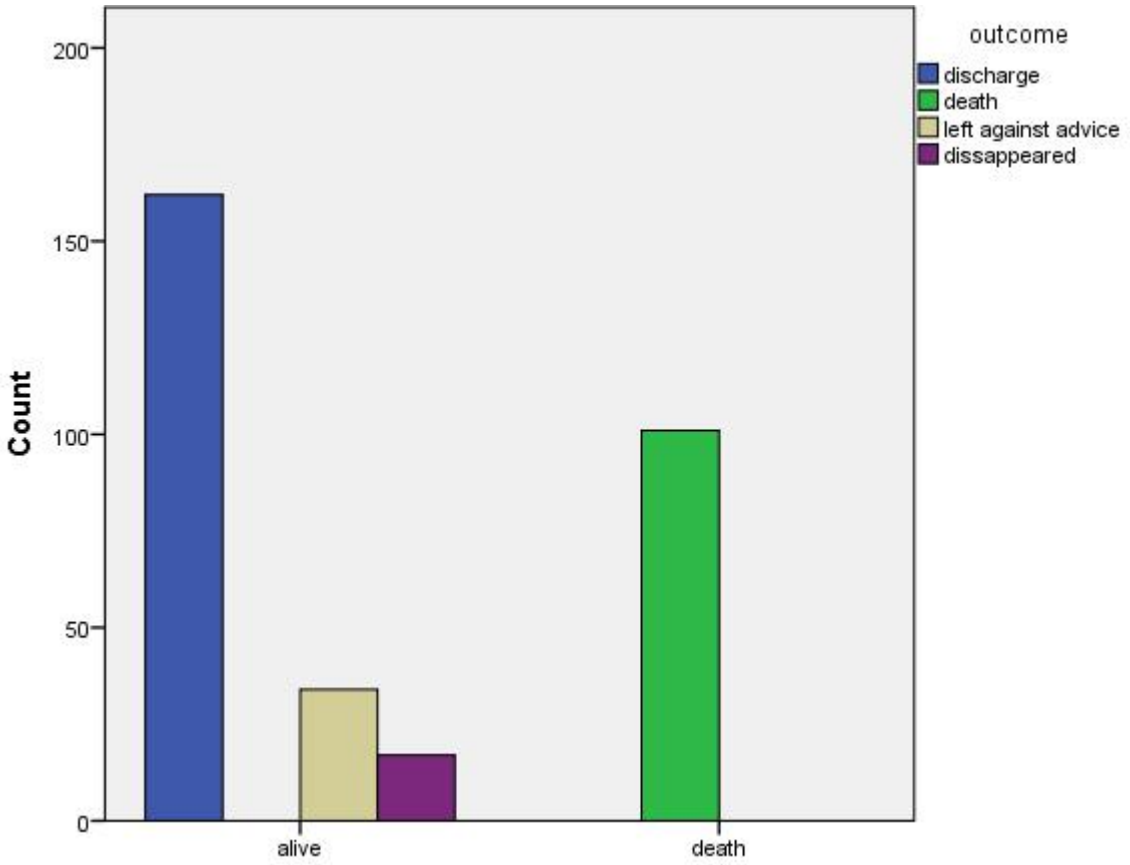

Fig. 2: Distributions of hospital outcomes of perinatal asphyxia, who were admitted to FHCSH from September, 2017 to February, 2019 G.C.

6. Discussion

The aim of this study is to know short term outcomes of perinatal asphyxia among admitted neonates with perinatal asphyxia at FHCSH. Perinatal asphyxia contributes significantly to short term neonatal morbidity and mortality to the current era. The mortality rate in this study was significantly high from other many studies at Dire dawa. eastern Ethiopia, SokotoNigeria, Tanzania, Bangladish, Uganda and eastern Nepal, but study done at Singapore and Enugu Nigeria were higher(6, 10, 23, 26, 28, 31), (30, 34) which may be due to the low proportions of mild HIE and higher proportions of severe HIE at admission, Poor NICU set up after they develop Most cases had complications High neonatal admissions in our set up so sarnat and sarnat clinical staging is strong predictors of short term outcomes. Highest proportions of death occurred in the 1st three days of post natal age, which is similar with study done at Muhimbilinational hospital in Dares salaam, Tanzania.(36)

The short term outcomes of perinatal asphyxia is depends up on sarnat clinical staging, of which the survival rate of stage III perinatal asphyxia was high, but stage II survival rate was low, compared to study done at Lumbini Medical College, (37), these may be due to NICU facility difference, while the higher mortality rate of stage III HIE was similar with the study done at Tanzania(10). But mild or stage I HIE had good outcomes which is consistent with study at India(38).In this study the highest portions of patients born at home was died which is consistent with study done at Katihar, Bihar, India.(16)

In this study all cases develop HIE which is higher from all studies had reviewed, while mortality was mostly seen with complications like necrotizing enterrocolities, followed by respiratory distress among they develop this complications the proportion of death was high. Among patients who had seizure and refractory for control and needs three anticonvulsant has highest mortality (40%) of its proportion, which is lower than study done at, India(38).

In this study neonatal mortality was strongly associated wi

There was high ANC coverage (99.7%) which is consistent with study done at Tigray national regional state but lower finding to study done at Nigeria(39) which may be due to the difference of study period.

In this study Primi para is associated with perinatal asphyxia in most of the cases as well as many studies shows this finding(28), premi para mothers are more predisposed to most antenatal-related-obstetric complications compared to multiparous mothers, this may be due to presence of stress with fear of psychosocial support and it also new, presence of trail labor may delay any decision regarding to health care provider who attend labor.

Most are delivered by SVD, which is consistent with study done at Jimma, Ethiopia and Central Park Medical College, Lahore(24, 27) but lower than study done at Bangalore, India and Eastern Nepal, India(12, 31). Sixty one (19.4%)neonates were born by C/S with frequent indication being NRFHRP and as a cause which is consistent with study done at Congo.(40) Among maternal obstetric complication infection was results high mortality as a proportion which is consistent with study done at southern Nepal.(41)

In this study most of the cases are term, which is lower than a study done in Tigray national regional state, Ethiopia and Eastern Nepal, India (25, 31).but in this study mortality is mostly seen in neonates with prematurity, home delivery, hospital stay<72hrs and LBW which were

consistent with study done at eastern Nepal and Enugu Nigeria.(31, 34) and in different studies there is variation in term and pre term, this is due to the different inclusion and exclusion criteria, so in this study most pre terms were excluded from the study, otherwise the risk of term versus pre term risk of hypoxia is still on animal model studies. Most of the cases are males which may be due to socio cultural belief of the family, mostly males sick medical attention, but susceptibility of male new born to hypoxia compared with matched females is still on animal model study. In LBW neonates it may be due to maternal chronic illness like DM, obstetric complications like pre eclamcia were a possible causes and the insult started at antenatal period.
In this study most neonates develop seizure in the neonatal period, these may be due to the presence of predominant excitatory neurotransmitters [N-methyl-D-aspartic acid (NMDA) and a-amino-3-hydroxyl-5-methyl-4-isoxazolepropionic acid (AMPA)] in the first few weeks of post natal age, immature inhibitory systems and g-aminobutyric acid, the primary inhibitory neurotransmitter in adults, is paradoxically excitatory in the neonates.(42) They were needed dual therapy (calcium gluconate and phenobarbitone) 133(73.5%), but only 11(6%) of seizure was controlled by calcium gluconate mono therapy, which is lower than study done at gonder university hospital.(43) These result difference may be due to the research includes different causes of seizure other than perinatal asphyxia. There was also study done to show the trained of different AED use for neonatal seizure with HIE, the commonest drug was phenobarbitone which is similar to our study but in this study there was no use of Ca. gluconate which is opposite to this study,(44)this may be due to set up variation, in that set up they exclude electrolyte imbalance prior to initiation of mgt, but in our set up electrolyte determination takes longer period and may be not done, so empirically Ca. gluconate was given for all neonate with perinatal asphyxia who had active seizure in the first 72hrs of post natal age after excluding hypoglycemia.

In this study absence of documented APGAR score was high 124(39.5%) compared to other institution, even though the proportion of institutional delivery was high, these may be due to health care provider's attitude towards benefit of proper documentations. In resource limited countries like Ethiopia, APGAR is the most indicator of prognosis. In this study documented low APGAR score is strongly associated with complications as well as poor short term outcomes of perinatal asphyxia, which is consistent with study done at Nigeria(6). In this study majority of

the patient arrived to the hospital with in 6 hrs of post natal age, but it is lower than study done at Central Park Medical College, Lahore(27)

7. Conclusion

Neonatal mortality and morbidity rate of perinatal asphyxia is high at FHCSH.

Most cases with sarnat and sarnat clinical stage III, pre term, BW less than 2500gm, home delivery and complicated with NEC had poor prognosis, while good neonatal short term outcome was related with sarnat clinical stage I HIE.

As we see in this study mostly deaths happened in the first twenty four hour and most neonates were term, single and had NBW, which shows that causes of most of perinatal asphyxia was intrapartum related conditions.

Mostly use of Ca gluconate didn't control seizure.

8. Strength and limitations

Strength; all cases on the study period were included in the study.

Limitation; the study is retrospective.

The loss of registration, there is unknown results, like marital status, religion, income, educational status, APGAR score, resuscitation hx, and duration of resuscitation.

9. Recommendation

Once they develop perinatal asphyxia, mortality and morbidity was high, so it is better to prevent rather than treating perinatal asphyxia.

Most neonates who develop perinatal asphyxia are term, NBW and single, so any one who attend labor should be strictly monitor the mother as well as the fetal condition during labor and delivery.

All health care providers should document APGAR score, resuscitation history, duration of resuscitation and other clinical parameters clearly, while any time evaluate the patient as well as they refer or discharge a patient**.**

Even though majority has ANC follow up as well as institutional delivery, perinatal asphyxia is high, so health care provider's should identify high risk pregnancy during ANC follow up and and also timely referral to better health facility as well as after delivery newborn should get optimal care at the facility and if needs referral should be timely.

Based on this study primi para mother should need a special follow up during labor and delivery.

Increase labor and delivery preparedness of the mother during ANC follow up to eliminate home delivery, because mortality is high for neonates who were delivered at home.

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Annex

ASSESSMENT OF SHORT TERM OUTCOMES AND ASSOCIATED FACTORS OF PERINATAL ASPHYXIA AMONG NEONATES ADMITTED AT FHCSRH NICU FROM JANUARY 1 TO DECEMBER 30, 2018, BAHIRDAR ETHIOPIA.

A. Socio demographic characteristics of the mother and the neonate.

1. MRN----------
2. Maternal age
    1. 15-19
    2. 20-24
    3. 25-29
    4. 30-34
    5. 35-39
    6. 40-44
3. Residency

1. Urban 2. Rural

4. Parity:

1. P I 2. P II 3. P III 4.P IV 5 ≥ PV

5. Gestational age;

1. Preterm 2. Term 3.post term 4.unknown

6. Educational status of the mother.

1. Litrate 2. Illiterate 3. Unknown

7. Sex of the neonate;

1. Male 2. Female

8. Maternal religion;

1. Orthodox 2. Muslim 3. Prothestant 4. Un known

9. Marital status;

1. Married 2. Unmarried 3. Un known

B. Labor and delivery conditions;

10. Onset of labor:

1. Spontaneous 2. Induced

11. Duration of labor: 1. <3hr 2. 3-24hr 3. ≥24hr

12. Duration of ROM: 1. <18hr 2. ≥ 18hr

13. Site of delivery: 1. Institutional 2. Home 3. BBA

14. Mode of delivery: 1. SVD 2. Instrumental 3. C/S

15. If it was instrumental or C/S delivery, indication

1. Obstructed labor 3. NRFHRP
2. APH 4. If other, specify

16. Delivery was attended by;

1. By mid wives/nurse 3.by traditional birth attendant
2. By gynecologist/ resident 4. If other, specify..

17. Birth outcome:

1. Singleton 2. Twin 3.Triplet

18. Birth weight:

1. VLBW 2.LBW 3. NBW 4 .LGA 5. UBW

19. 1st minute AGAR score:

1. ≤ 3 2. 4-7 3.>7 4. UK

20. 5th minute AGAR score:

1. ≤ 3 2. 4-7 3.>7 4. UK

21. If APGAR unknown did neonate cried immediately? 1. Yes 2. No

22. was the new born was resuscitated? 1. Yes 2. No 3 unknown

23. If yes for how long?

1. <5minute 2. 5-10 minute 3. 10-20 minute 4> 20 minute 5.un known

C. Neonatal medical conditions and complications;

24. Age at admission 1. < 6 hr 2.6hr-1 day 3.1-3days 4.>3days

25. Was the neonate was admitted to other health facility?

1. Yes 2. No

26. Stage of asphyxia at admission 1. Stage I 2. Stage II 3.stage III

27. Neonatal reflex at admission

1. Intact 2. Depressed 3.Absent

28. Complication of asphyxia

1. Seizure 2. ARF 3.NEC 4.RDS 5.seizure & ARF 6. Seizure & NEC 7. None

29. Secondary diagnosis

1. MAS 2. CHD 3.SGH 4. Severe anemia 5. EONS 6. MAS & SGH 7. SGH and severe anemia

30. Investigation done

1. RBS 2. RFT 3.CBC 4.serum electrolyte 5.RBS & CBC 6. all

31. Management given

1. Routine 2.INO2/CPAP 3. Anticonvulsant 4. calcium gluconate 5. 1 & 2 6. 3 & 4 7. all

32. f the new born took anticonvusant , how much

1. Controlled by one 3. Controlled by three anticonvulsants
2. Controlled by two

33. Duration of hospital stay:

1. <24hr 2.1-7days 3.7-14days 4.14-28 days 5.>28days

34. Outcome:

1. Discharged2. Died 3.Left against advice 4. Disappeared

35. If discharge what was the condition at discharge?

1. Improved 2. With disability 3 .unknown

36. If neonate was died Cause of death :

1. Over whelming sepsis 2. Advanced NEC 3. Asphyxia 4. Res.failure

D. Maternal medical conditions;

37. Does the mother has ANC follow up?

1. Yes 2. No

38. If, yes site of ANC follow up; 1. LHC 2. HOSPITAL

39. Does the mother has obstetric complication?

1. Yes 2. No

40. If yes what complication does she has?

1. Pre-eclamcia2. GDM 3. Chorioamnionities4. APH

41. Does the mother has chronic medical illness.

1. Chronic HTN 2. HIV 3. DM 4. Psychiatric illness 5. NO

42. Does the mother took any medication

1. Yes 2. No

43. If yes, what medication was taken?

1. Mgso4 2. Diazepam 3. GA 4. If other specify…