


Perinatal Asphyxia Among Neonates Admitted Jimma Medical Center, Jimma, Ethiopia

Global Pediatric Health
Volume 7: 1–5
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DOI: 10.1177/2333794X20981304
journals.sagepub.com/home/gph


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Abstract

Background: Perinatal asphyxia is a severe problem which causes serious problem in neonates in developing countries. This study is aimed to determine magnitude of perinatal asphyxia and its associated factors.

Methods: A cross-sectional study design was conducted among neonates admitted over a period of 4 years on 740 samples. Systematic sampling method was employed to get required samples from log book. Epi-data 3.1 is used for data entry and the entered data was exported to SPSS Version 23 for analysis. Bivariable and multiple variable logistic regressions analysis were applied to see the association between dependent and independent variables. Finally, P -value $< .05$ at 95% CI was declared statistically significant.

Results: The main significant factor associated to perinatal asphyxia were prolonged labor ($P = .04$, AOR = 1.68 95%CI: [1.00, 2.80]), being primipara ($P = .003$, AOR = 2.06, 95%CI: [1.28, 3.30]), Small for Gestational Age (SGA) ($P = .001$, AOR = 4.35, 95%CI: [1.85, 10.19]), Large for Gestational Age ($P = .001$, AOR = 16.75, 95%CI: [3.82, 73.33]) and mode of delivery.

Conclusion: The magnitude of perinatal asphyxia was 18%. Prolonged labor, parity, birth size, mode of delivery, and APGAR score at 1st minute were significantly associated with perinatal asphyxia. So, Nurses, Midwives, Medical Doctors, and health extension workers have to engage and contribute to on how to decrease the magnitude of perinatal asphyxia.

Keywords

perinatal, asphyxia, neonate, Jimma Medical Center, neonatal intensive care unit

Received April 22, 2020. Received revised MM DD, YY. Accepted for publication November 16, 2020.

Introduction

Perinatal asphyxia is defined as incapability of the newborn to begin and withstand satisfactory respiration after delivery,^{1,2} because of absence of sufficient fetal-neonatal oxygenation in antepartum, at birth, and in the first minutes of life, and it is a it is a touchy me oasuref the nature of care given in the perinatal period to the woman and the newborn.³ The estimations of the incidence of perinatal asphyxia differ from place to place and institution to institution. Study conducted in London, Institute of Child Health reported that an incidence of perinatal asphyxia is 1 to 6 per 1000 live full-term births babies.⁴

Globally, birth asphyxia remains a major clinical problem and one of the common and leading causes of neonatal morbidity and mortality, especially in developing

countries.^{1,5} Worldwide report investigating when, where and why 4 million neonatal deaths have occurred showed that 99% of these neonatal deaths take place in the developing countries where perinatal asphyxia contributes to almost 23% of these deaths.¹ Another study also identified risk factors for the development of perinatal asphyxia, which are mostly preventable, and were not always similar for the different study populations. Thus,

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difference in results shows that as these factors were not fully addressed.^{6,7}

Four million babies are born with asphyxia each year. According to statistics report by World Health Organization (WHO), in developing countries, 3.6 million babies suffer from asphyxia, of whom 23% (840 000) die which is nearly equivalent to nearly 1 million neonatal deaths per year^{1,8} and in a countries with high neonatal mortality rates the death rate is 8 times that of countries with low (Neonatal Mortality) NMRs and almost the same number suffer from the associated consequences.^{1,9}

Perinatal asphyxia leads to organ damage in newborns and leads to severe life-long complications. Although birth asphyxia is not always distinct as the cause of perinatal and postnatal death, its noticeable impact for the mortality in newborns is well-documented, representing profound deficits in current health-care systems worldwide.^{10,11}

Even though Ethiopia reached its child mortality reduction goal 2 years earlier, the neonatal mortality rate remained high. One of the major causes of newborn deaths was intra-partum related complications of which birth asphyxia accounts 25%.¹² In the era of SDG an increased focus is given to reduce child mortality by 75% focusing at reduction of neonatal mortality to 12 per 1000 live births.¹³

Methods

The study was conducted in Jimma Medical Center (JMC) which is located in Jimma town, 346 km southwest of Addis Ababa. Jimma university medical center is one of the biggest and oldest university specialized hospital in the country established in 1922 and providing service for more than 15 million people in the catchment area. Currently, it is the only teaching and referral hospital in south western part of the country. Retrospective institutional based cross-sectional study over a period of 4 years (January 1, 2014 to December 31, 2017) was conducted. All neonates in age group of 0 to 28 days admitted in the NICU unit of the JMC from January 1, 2014 to December 31, 2017 were included and incomplete charts were excluded from the study. Systematic sampling technique was used to get required samples from database. To ensure the quality of data pretest was done on 5% of the sample size. Based on pretest the necessary modifications were done. Additionally, training was given for data collectors on objectives and methods of data collection. After data collection, internal consistency was checked by cross-checking the collected data on daily basis and supervision was made by the investigators. The data was checked for completeness, coded, cleaned and entered

into Epi-data version 3.1 and exported to SPSS version 23 for analysis. Binary and multiple variable logistic regressions analysis were done see association between dependent and independent variables. P -value $< .05$ was declared a statistically significant. Ethical clearance and approval to conduct this research was obtained from research and ethical review of school of Nursing and midwifery, Jimma University and permission to conduct the study was also requested from JMC Administrative office. To keep the confidentiality of the patients, all collected data was coded and locked in a separate place and used only for this research purpose.

Result

Neonatal Factors

Out of 740 samples, 58 of the samples were excluded from the study due to incompleteness of required variables. Six hundred eighty-two (682) were eligible for the study, out of which 422 (61.9%) were males. Majority of them, 466 (68.3%) were admitted in less than 24 hours of their birth. Regarding their weight, more than half, 414 (60.7%) of the neonates had weight 2500 to 4000 g and almost all, 605 (88.7%) of them were appropriate for their gestational age. More than half, (61.4%) of them had an APGAR score of 7 to 10 at 5th minute (see Table 1).

Maternal Factors

Concerning their place of residence, more than two third, 456 (66.9%) of them live in rural area. Regarding parity, 368 (54%) were multiparous mothers. Among 307 (52.74%) of mothers having maternal disease, 95 (30.9%) of them had infections followed by hypertensive disorder of pregnancy which accounted 77 (25.1%). Regarding to mode of delivery, about half, 352 (51.6%) of neonates were delivered by spontaneous vaginal delivery (see Table 2).

Factors Associated to Perinatal Asphyxia

Prolonged labor, parity, birth size, mode of delivery, and APGAR score at 1st minute were significantly associated to perinatal asphyxia. Mothers who had prolonged labor ($P = .04$, AOR = 1.68 95%CI: [1.00, 2.80]) were 2(two) times more likely acquired Perinatal asphyxia compared those of mothers with non-prolonged labor mothers. Those neonates who were born from primipara mothers ($P = .003$, AOR = 2.06, 95%CI: [1.28, 3.30]) were 2 times more likely acquired perinatal asphyxia (PNA) compared to neonates born from multiparous

Table 1. Neonatal Factors Among Neonates Admitted in Jimma Medical Center in NICU Unit, Jimma, South West Ethiopia, 2019.

Variables	Frequency	%
Sex (n = 682)		
Male	422	61.9
Female	260	38.1
Age (n = 682)		
<24 hours	466	68.3
24 hours to 7 days	176	25.8
>7 days and <28 days	40	5.9
Gestational age at birth (n = 682)		
Preterm (32-37 weeks)	228	33.4
Term (37-42 weeks)	434	63.6
Post-term (>42 weeks)	20	2.9
Birth weight (g) (n = 682)		
Low birth weight (<2499)	249	36.5
Normal birth weight (2500 g-4000 g)	414	60.7
Microsomia (>4000 g)	19	2.8
Birth size (n = 682)		
Appropriate for gestational age	605	88.7
Small for gestational age (SGA)	48	7.0
Large for gestational age (LGA)	29	4.3
APGAR score at birth (1 minute) (n = 613)		
0 to 3	54	7.9
4 to 6	256	37.5
7 to 10	303	44.4
APGAR score at birth (5 minute) (n = 613)		
0 to 3	18	2.6
4 to 6	176	25.8
7 to 10	419	61.4
Resuscitation done at birth (n = 682)		
Yes	109	16.0
No	573	84.0

mothers. Similarly, Small for gestational age ($P=.001$, AOR=4.35, 95%CI: [1.85, 10.19]) and Large for gestational age ($P=.001$, AOR= 16.75, 95%CI: [3.82, 73.33]) neonates acquired 4 and 16 times more likely compared to neonates with appropriate for gestational age respectively. Neonates delivered with assistance of instruments ($P=.000$, AOR=3.78, 95%CI [2.09, 6.85]) were 4 times more likely acquired PNA compared to those neonates delivered by SVD. Neonates whose APGAR score 0 to 3 ($P=.020$, AOR=2.43, 95%CI [1.14, 5.15]) and 4 to 6 at 1st minute ($P=.031$, AOR=2.24, 95%CI [1.07, 4.68]) were 2 times acquired perinatal asphyxia compared neonates whose APGAR score were 7 to 10 at 1st minute (see Table 3).

The magnitude of perinatal asphyxia was 18% (see Figure 1). Out of this 44.7% of them were diagnosed as having stage II perinatal asphyxia (see Figure 2).

Table 2. Maternal Characteristics in Jimma Medical Center in NICU Unit, Jimma, South West Ethiopia, 2019.

Variable	Frequency	%
Place of residence (n = 682)		
Urban	226	33.1
Rural	456	66.9
Place of delivery (n = 682)		
In born	410	60.1
Out born	272	39.9
Parity (n = 682)		
Primipara	314	46.0
Multipara	368	54.0
Maternal diseases (n = 307)		
Gestational diabetes	14	4.5
Hypertensive disorder of pregnancy	77	25.1
Infections	95	30.9
HIV/AIDS	14	4.5
Antepartum hemorrhage	39	12.7
PROM	60	19.5
Others	8	2.6
Mode of delivery (n = 682)		
Spontaneous vaginal delivery	352	51.6
Cesarean section	226	33.1
Instrumental delivery	104	15.2
Prolonged labor (n = 682)		
Yes	128	18.8
No	554	81.2

Table 3. Multivariable Analysis of Factors Associated to Perinatal Asphyxia in Neonates Admitted to JMC in NICU, Ethiopia, 2019.

Variables	AOR (95% CI)	P value
Prolonged labor		
Yes	1.68 (1.00, 2.80)	.04*
No		1
Parity		
Primi para	2.06 (1.28, 3.30)	.003*
Multipara		1
Birth size		
AGA		1
SGA	4.35 (1.85, 10.19)	.001*
LGA	16.75 (3.82, 73.33)	.000*
Mode of delivery		
SVD		1
Instrumental	3.78 (2.09, 6.85)	.000*
CS	0.78 (0.9, 3.85)	.112
APGAR score at first minute		
0 to 3	2.43 (1.14, 5.15)	.020*
4 to 6	2.24 (1.07, 4.68)	.031*
7 to 10		1

1, reference categories.

*Significant association.

Discussion

This study revealed that the magnitude of perinatal asphyxia is 18%. Different studies showed as the prevalence of perinatal asphyxia is different from place to place. Study from Nigeria reported that the prevalence of perinatal asphyxia was 29.4%.¹⁴ Another study from Ghana reported that 283(61.8%) were admitted due to perinatal asphyxia.¹⁵ A study from Cameroon showed that the prevalence of asphyxia was 14.5%.¹⁶ This difference might be due to difference in maternal services given from place to place.

From this study prolonged labor was significantly associated to perinatal asphyxia. This result is consistent with the earlier findings in India, Cameroon, Pakistan, Nigeria, and Thailand.¹⁶⁻²⁰ This might be due to fetal and

maternal exhaustion and fetal distress which results in birth asphyxia.

In this study, LGA was significant predictors of PNA. Neonates who were LGA might acquire PNA due to fetopelvic disproportion, which results in prolonged or obstructed labor as compared with AGA. Primipara was also identified as a significant risk factor of perinatal asphyxia which is in line with study conducted in different places (Ahmedabad, Nigeria, and Karachi).²¹⁻²³ This might be explained that, primi-parous women are often ignorant of the demands of pregnancy there by neglecting early booking and regular attendance to antenatal care. This may result in complications of prolonged labor, which may subsequently end up with delivery of asphyxiated babies.

Instrumental delivery was found to be associated with asphyxia in this study, which is consistent to study conducted in Dire Dhowa and Gusau.^{24,25} This may be explained by the fact that the hospital is a referral center where cases that could not be managed by other hospitals are referred to and also where women with pregnancy/labor complications attend without referral. It might be also due to the pelvic disproportions and prolonged labor which make deliveries more difficult. These could lead to fetal complications which resultant in fetal distress and ultimately perinatal asphyxia.

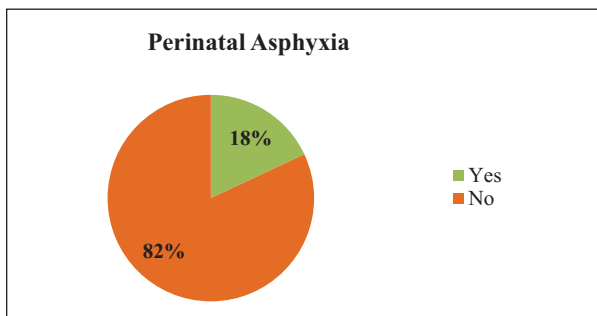


Figure 1. Stage of perinatal asphyxia among neonates admitted in Jimma Medical Center in NICU units, Jimma Town, South west Ethiopia.

Conclusion

The magnitude of perinatal asphyxia was 18% of which stage perinatal asphyxia was predominant. Prolonged

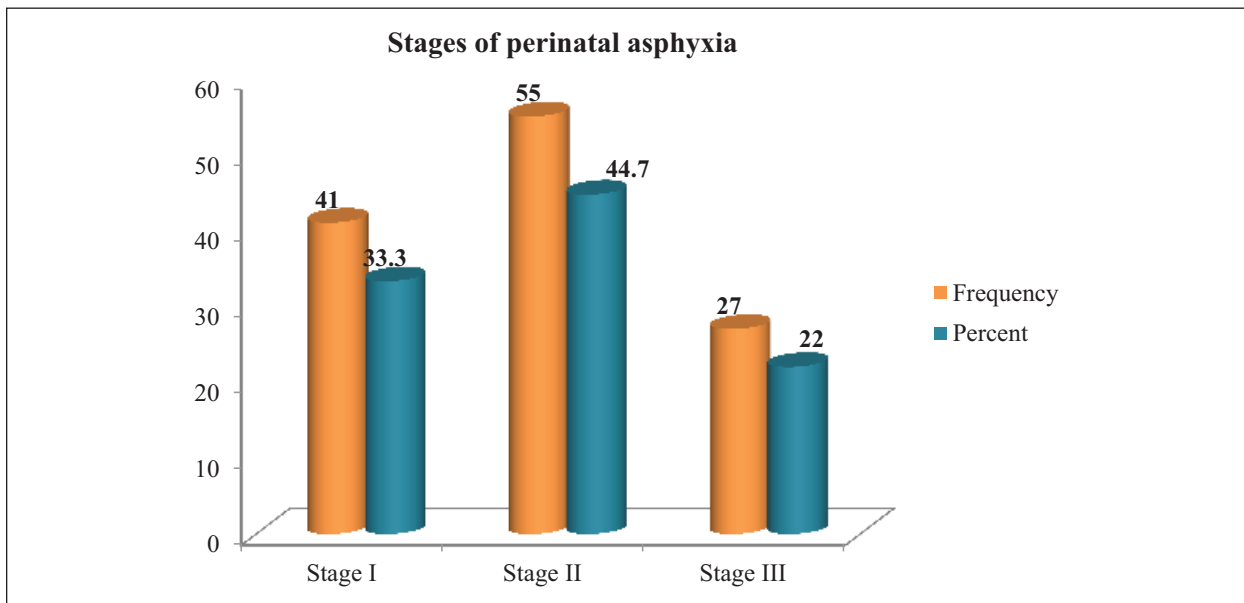


Figure 2. Magnitude of perinatal asphyxia among neonates admitted in Jimma Medical Center in NICU units, Jimma Town, South west Ethiopia.

labor, parity, birth size, mode of delivery, and APGAR score at 1st minute were significantly associated to perinatal asphyxia.

Acknowledgments

We would like to extend my thanks Jimma Medical Center for their cooperation during data collection and data collectors.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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