Prevalence and Risk Factors for Perinatal Asphyxia as Seen at a Specialist Hospital in Gusau, Nigeria

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Abstract

Introduction: Perinatal asphyxia is a global neonatal problem which significantly contributes to both morbidity and mortality. It is the fifth largest cause of under-five mortality. This study was aimed to determine the prevalence, risk factors and outcome of perinatal asphyxia in newborns seen in the Special Care Baby Unit. Materials and Methods: A retrospective study of newborns managed for perinatal asphyxia over a 1-year period. All inborn babies with Apgar scores <6 at 5 min and out born babies with no Apgar score but with features of asphyxia were studied. Case files of the patients were retrieved and relevant information was obtained. Results: Of the 223 neonates admitted during the study period, 67 (30.1%) newborns had perinatal asphyxia from our record; but only 47 (70.1%) case files with complete data were retrieved, giving a prevalence of 21.1%. Twenty five (53.2%) of the mothers were primiparous, 31 (66.0%) had no antenatal care and 25 (53.2%) presented with prolonged obstructed labor. Twenty-eight (59.6%) of the newborns were females; 41 (87.2%) were term, 27 (57.4%) of normal birth weight, 42 (89.4%) delivered in the hospital and mostly through an emergency caesarean section. Thirty (63.9%) of the newborns were discharged; while 12 newborns died, giving a case fatality rate of 25.5%. Conclusion: Perinatal asphyxia is a significant cause of morbidity and mortality in Gusau. Health education of pregnant mothers on antenatal care for early detection of high-risk pregnancy is highly recommended in order to reduce the high incidence of this preventable condition.

Keywords: Apgar, asphyxia, newborn, perinatal
Introduction

Perinatal asphyxia is a common and serious neonatal problem globally and it significantly contributes to both neonatal morbidity and mortality. According to the World Health Organization (WHO) in 2000, of the 130 million infants born globally each year, approximately 4 million babies die before they reach the age of 1-month. [1] It has been shown that 99% of these neonatal deaths take place in the developing countries where perinatal asphyxia contributes to almost 23% of these deaths. [1] Over half of these deliveries occur at home. [1] In the latest World Health Statistics 2013, [2] neonatal deaths have decreased from 4.4 million in 1990 to 3 million in 2011.

Perinatal asphyxia is estimated to be the fifth largest cause of under-five child deaths (8.5%), after pneumonia, diarrhea, neonatal infections and complications of preterm birth. [3] Millennium developmental goal 4 (aiming at a two-thirds reduction in under-five mortality by the year 2015 from a baseline in 1990) can only be met by substantially reducing neonatal deaths. Indeed, newborn deaths constitute over 40% of all deaths in children aged under five. [3]

Asphyxia is defined as the inability of the newborn to initiate and sustain adequate respiration after delivery. [4] The American College of Obstetricians and Gynecologists and the American Academy of Pediatrics assign a neonate to be asphyxiated if the following conditions are fulfilled: Umbilical cord arterial pH <7; Apgar score of 0-3 for longer than 5 min; neurological manifestations (e.g., seizures, coma, or hypopnea); and multisystem organ dysfunction, e.g., cardiovascular, gastrointestinal, hematological, pulmonary or renal system. [5]

Having gone through the literature, there is no documented report on perinatal asphyxia from this area despite its high contribution to neonatal morbidity and mortality. This study was carried out to determine the prevalence of perinatal asphyxia in our Special Care Baby Unit (SCBU). We also aimed to determine the risk factors, mode of delivery and outcome of newborns admitted with perinatal asphyxia.

Materials and Methods

This study was conducted in the SCBU of Yariman Bakura Specialist Hospital (YBSH) Gusau. The hospital is the specialist hospital of the Zamfara State Government, Nigeria. It serves as a secondary and Tertiary Care Centre for the state capital, as well as a referral center for all the local government areas of the state. This is a descriptive retrospective cross-sectional study of newborns admitted and managed for perinatal asphyxia between 1st April 2013 and 31st March 2014 in YBSH.

All infants with Apgar scores <6 at the 5th min of life and out born babies with no Apgar score, but with a history of poor cry or inability to cry from birth, with poor color, respiratory distress, floppiness [6] or multi organ involvement were reviewed. Late preterm (near term), term, and post term babies were included in the study.

Apgar score was one of the criteria used to define birth asphyxia in this study, due to unavailability of blood gas analysis in babies delivered in the hospital. It is moderate asphyxia if the 5 min Apgar score is 4-5, or required stimulation and oxygen administration before a cry. Severe asphyxia is when the score is 0-3 or is associated with seizures, central cyanosis or coma; or history of inability to cry in those without Apgar score. [7] Newborns with low Apgar score or history of inability to cry with organ involvement such as renal or cardiac were also included.

Exclusion criteria include neonates suffering from major congenital anomalies or syndromes and preterm babies <35 completed weeks because the Apgar scores of non-asphyxiated preterm babies are normally low due to poor neurological maturity. Birth weights were divided into low birth weight (<2500 g), normal birth weight (2500 g to <4000 g) and macrosomia (>4000 g).

Case files of the patients were retrieved and relevant information were obtained which include: Age, sex, birth weight, gestational age, parity of mothers, booking status, mode of delivery, Apgar score for inborn, place of delivery, and problems during pregnancy or labor in the mothers.

Data were entered into SPSS version 16 (SPSS Inc., Chicago, IL, USA), for cleaning and analysis using standard methods. Quantitative variables were summarized using mean and standard deviation. Categorical variables were summarized using frequency and percentages. Chi-square test and Fisher's exact test (for sample size <5 in a cell) were used for association between categorical variables. A P < 0.05 was considered statistically significant.

Results

During the study period, a total of 223 neonates were admitted into the SCBU, of which 67 (30.1%) babies were managed as cases of perinatal asphyxia as documented in our record book. However; we were able to retrieve case files of 47 (70.1%) babies that had complete data, which gave us a prevalence of 21.1%. There were 19 (40.4%) males and 28 (59.6%) females; giving a male:female ratio of 0.68:1.

Highest number of cases was seen in the month of June, and no case was admitted in December as shown [Figure 1].
A total of 37 (78.7%) babies presented <12 h of life, 8 (17.0%) between 12 and 24 h and only 2 (4.3%) presented after 24 h of life.

Most of the mothers of the newborns with asphyxia were primiparous, unbooked and presented with prolonged obstructed labor as shown in [Table 1]. The most common co-morbid condition in the mothers was the eclampsia.

<table>
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<th>Table 1: Ante/Inatal profile of mothers</th>
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Majority of the newborns were term, of normal birth weight and delivered in the hospital mostly through an emergency caesarean section as shown in [Table 2]. The mean birth weight was 3.60 ± 0.58 kg.

<table>
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<th>Table 2: Natal/Post natal profile of the newborns</th>
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Six (12.8%) of the newborns presented with seizures, 5 (10.6%) with inability to suck and 42 (89.4%) with inability to cry after birth and all of them were hypotonic. Fourteen (29.8%) had Apgar score of 0-3 while 28 (59.6%) had Apgar score of 4-5. Five (10.6%) had no Apgar score as they were delivered at home.

The average duration of hospital stay was 3.8 ± 4.12 days, with a minimum of 1 h and a maximum of 18 day; with 38 (80.9%) neonates staying for a period of 7 days. Thirty (63.9%) of the newborns were discharged, 5 (10.6%) left against medical advice and 12 died resulting in a case fatality rate of 25.5%.

The risk factors for asphyxia were hospital delivery, delivery through caesarean section and eclamptic mother as shown in [Table 3]. Even though most of the mothers were unbooked, had prolonged obstructed labor and were primiparous, with the majority of the newborns being term, these were not significantly associated with Apgar score as shown in [Table 3].

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<th>Table 3: Association between risk factors of asphyxia and AS</th>
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Overall neonatal mortality from perinatal asphyxia over the study period was 5.4%. Five (41.7%) newborns died following delivery through emergency caesarean section while the remaining seven (58.3%) that died were delivered through spontaneous vaginal delivery. Nine (75%) newborns from mothers that had prolonged obstructed labor died while the remaining three (25%) survived. Nine (64.3%) out of the 14 babies with Apgar score of <3 died. Mortality was significantly associated with low Apgar score (Fisher's exact = 0.000). However, it was not associated with mode of delivery ($\chi^2=2.146, P=0.143$), place of delivery (Fisher's exact = 1.000) nor with prolonged obstructed labor (Fisher's exact = 0.103). Booking status did not affect mortality statistically ($\chi^2=0.417, P=0.518$). There was no association between mortality and gender, even though, more females than males died from asphyxia ($\chi^2=0.010, P=0.919$).

Discussion

The overall prevalence rate of perinatal asphyxia was 21.1%. This high rate could be explained by the fact that our hospital is the state referral center where complicated cases are referred. Previous studies on perinatal asphyxia provided separate prevalence rates for categories of asphyxia. [8],[9],[10]


The prevalence rate obtained for moderate birth asphyxia is lower than what was obtained by Wester et al. [8] in Port Harcourt, but higher than what Mukhtar-Yola and Iliyasu [9] in Kano and Ugwu et al. [10] in Warri obtained. Omoigberale et al. [14] in a 4 year review found asphyxia to be a significant cause of morbidity in Benin. Low Apgar score, especially at 5 min was universally accepted to predict survival. [15] However, its inability to correctly diagnose perinatal asphyxia and predict long-term neurodevelopmental disabilities attracted criticism. [16]

Various criteria used in defining perinatal asphyxia could be responsible for the differences in prevalence rates. First, varied incidence observed in various studies could be due to various definitions of perinatal asphyxia used by the authors of the studies cited in the present study. Second, this study was conducted in the State Tertiary Centre where many of the high-risk pregnancies are referred and managed. Third, most of the mothers' presented late and there was also delay in obtaining consent for caesarean section by the mother and or her
This study has shown perinatal asphyxia to be a significant cause of morbidity and mortality in neonates seen at YBSH, Gusau. It was more so that the supervision of labor in the mothers. This highlights the need for antenatal care with regular visits and for delivery in health facilities.

Pregnancy and labor complications that contributed to asphyxia in our study may have resulted from inadequate antenatal care and lack of supervision, which may result in complications of prolonged labor, which may subsequently end up with delivery of asphyxiated babies.

Our study has also shown that asphyxia is more common in babies of unbooked mothers as seen in Warri,[10] India,[12] and Port Harcourt[21] unlike what was reported in Port Harcourt[8] and Johannesburg[17] where most of the mothers were booked. This leads to late diagnosis of high risk pregnancies; poor obstetrics outcomes and risk of perinatal asphyxia.

Prolonged obstructed labor was not found to be a common risk factor of asphyxia in our study, similar to what was found by Dalai et al.[18] in India. This contrasts reports by Ugwu et al.,[10] Kinoti,[13] Onyeyebruha et al.[21] and Osyn et al.[22] Reason for this cannot be explained even though 53.2% of the mothers had prolonged labor as some families in Gusau present late to the hospital for delivery when the mother is unable to deliver by herself or when complications occur.

Eclampsia was a found to be a risk factor of asphyxia in our study unlike what was found in India[18] We found that pregnancy-induced hypertension was uncommon, unlike in Benin[23] and Indian[22] studies. Reason for these may be attributed to some mothers not attending antenatal clinics in the northern part of the country; as a result those with pregnancy induced hypertension are not treated early and they end up presenting with eclampsia.

Parity of mothers was not found to be associated with mortality unlike what was reported by Onyiriuka[23] in Benin. However, our study highlighted primiparity to be common even though not a significant risk factor of asphyxia in our study as they constituted a large percentage of the mothers similar to what was reported by Kinoti,[13] Dalai et al.[18] and Onyebruha et al.[21] It has been shown that, primiparous women are often ignorant of the demands of pregnancy there by neglecting early booking and regular attendance to antenatal care.[21] This may result in complications of prolonged labor, which may subsequently end up with delivery of asphyxiated babies.

Hospital delivery was found to be associated with asphyxia in our study, similar to what was found in Port Harcourt by West et al.[8] This may be explained by the fact that our 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. These could lead to fetal complications with resultant fetal distress and eventually perinatal asphyxia.

Place of delivery was not associated with mortality in our study, even though most mothers delivered in the hospital; this was in agreement with what was reported by Padasayache et al.[17] in Johannesburg study. The reason for this cannot be explained, as it is expected that babies delivered at home should have a higher mortality since intervention is not offered immediately at home.

Mode of delivery in our study was found to be a risk factor for asphyxia as most of the women came with complications requiring immediate intervention. Delivery was mostly by emergency caesarean section, similar to what was reported in Iran[7] and Port Harcourt.[21] This could be explained by the fact that indications for the caesarean sections were mostly due to prolonged obstructed labor or eclampsia. This is unlike what was observed in Hyderabad[24] and Johannesburg,[14] where most of the newborns were delivered by vaginal route; although newborns delivered through caesarean section were mostly due to emergencies and some due to obstructed labor.

Birth weight of the babies was consistent with what was reported in Port Harcourt[8] and Johannesburg.[17] Most of our patients presented within the 1 st 12 h, and by 24 h 95.7% had presented to the hospital. This was higher than 81.0% and 71.6% observed in India by Memote et al.[21] and Sehga et al.[25] The difference may be due to the fact that Seha et al.[25] included all neonatal admissions while our study was only on asphyxiated babies who needed earlier admission for resuscitation or whose parents feared other serious complications and presented earlier.

Seizures which are seen in babies with severe asphyxia, were seen in 12.8% of the newborns which was in consonance with the report from Benin,[23] but lower than what was reported in Johannesburg.[17] Aire de et al.[26] reported seizures to be common in asphyxiated babies in Jos.

Duration of hospital stay was similar to Port Harcourt[8] and Johannesburg[17] studies. Reason for such similarity cannot be explained.

Our case fatality rate from perinatal asphyxia was unacceptably high as a quarter of the asphyxiated newborns died. This may be explained by the fact that most of the mothers were un-booked, presented with prolonged obstructed labor and some of them had pregnancy complications such as eclampsia and pre eclampsia. The case fatality rate is similar to reports from Abuja,[9] Warri,[10] India[19] and Benin.[23] Mortality from asphyxia was also found to be high in Ilesha[27] and Sagamu.[28] Furthermore, our fatality rate is higher than what was reported in Johannesburg[17] and India.[24] However, it was lower than what has been reported in Papua New Guinea.[29] Although we have reported high case fatality rate, asphyxia contributed to a low overall neonatal mortality rate, lower than what has been reported in many studies.

Pregnancy and labor complications that contributed to asphyxia in our study may have resulted from inadequate antenatal care and supervision of labor in the mothers. This highlights the need for antenatal care with regular visits and for delivery in health facilities.

**Conclusion**
This study has shown perinatal asphyxia to be a significant cause of morbidity and mortality in neonates seen at YBSH, Gusau. It was more common in babies of un-booked primiparous women who presented with eclampsia, prolonged obstructed labor and delivered through emergency caesarean section. Health education of pregnant mothers on the need to attend antenatal care for early detection of high-risk pregnancy is highly recommended in order to reduce the high incidence of this preventable condition.

**Limitation**

In this study, we used Apgar score and clinical signs to diagnose asphyxia. Our Apgar scores are believed to be assigned correctly by the maternity staff, obstetricians and pediatric doctors present at deliveries. However, using Apgar score alone to diagnose perinatal asphyxia has been found to be unreliable especially in predicting the outcome. [29]

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