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## Perinatal asphyxia in a specialist hospital in Port Harcourt, Nigeria

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**Abstract Objectives:** To find the prevalence, and identify risk factors and outcome in neonates who were admitted into the Braithewaite Memorial Specialist Hospital (BMSH) for perinatal asphyxia.

**Method:** This was a descriptive cross sectional observational study of neonates with low Apgar scores admitted over a period of ten months into the Special Care Baby Unit of the BMSH.

All babies with Apgar scores less than six at one minute and for whom consent was obtained were recruited consecutively. For out-born babies with no Apgar score recording, a history of poor cry from birth with either poor colour, respiratory distress, floppiness or loss of primitive reflexes were used.

**Results:** One hundred and fifty seven of 630 babies admitted had perinatal asphyxia giving a prevalence of 29.4%. Mean gestational age of affected babies was  $36.84 \pm 3.67$  weeks, and mean birth weight was  $3.0 \pm 0.9$ kg.

Sixty two (39.5%) of their mothers had no antenatal care (ANC). Mode of delivery in 98 (62.4%) was caesarian section, of which 80 (81.6%) were emergencies, many of whom had complications before presentation. One hundred and seven (68.2%) and 38(24.2%) babies, had Apgar Score of 4-5 and 0-3 in one minute respectively. The commonest risk factors were cephalopelvic disproportion (CPD) in the mothers and abnormal presentation, predominantly breech in the fetus. 31.6% of those with severe perinatal asphyxia died.

**Conclusion:** Prevalence of perinatal asphyxia is high. Lack of ANC, CPD and breech presentation were contributory factors. There is urgent need for maternal education on need for ANC, early intervention and skilled care of babies at birth.

**Key words:** perinatal asphyxia, newborns, specialist hospital

### Introduction

Perinatal asphyxia is a common neonatal problem and contributes significantly to neonatal morbidity and mortality. According to latest estimates by World Health Organization (WHO), of the 130 million infants born globally each year, approximately 4 million babies die before they reach the age of one month<sup>1</sup>. Ninety-eight percent of these neonatal deaths take place in the developing countries with perinatal asphyxia and birth injuries together contributing to almost 29% of these deaths<sup>1</sup>. Most of the births in developing countries occur at home, usually attended by untrained birth attendants. Birth asphyxia or more encompassing, perinatal asphyxia is estimated to be the fifth largest cause of under-five child deaths (8.5%), after pneumonia, diarrhoea, neonatal infections and complications of preterm birth<sup>2</sup>. It accounts for an estimated 0.92 -1.2 million neonatal deaths annually and is associated with another 1.1 million intrapartum stillbirths<sup>3-4</sup>, as well as an unknown

burden of long-term neurological disability and impairment.<sup>3</sup> Following improvements in primary and obstetric care in most industrialized countries, the incidence of birth asphyxia has reduced significantly and less than 0.1% newborn infants die from perinatal asphyxia.<sup>5</sup> In developing countries however, rates of perinatal asphyxia are still high, and case fatality rates may be 40% or higher.<sup>6-8</sup>

This study aims to explore the prevalence, recognize risk factors and outcome in neonates who were admitted into a specialist hospital for perinatal asphyxia.

### Methodology

This was a descriptive cross-sectional observational study of all newborns (0-28 days) with low Apgar scores admitted between 1<sup>st</sup> February to 30<sup>th</sup> October, 2011 into the Special Care Baby Unit (SCBU) of the Braithewaite

Memorial Specialist Hospital (BMSH) in Port Harcourt. The BMSH is the specialist hospital of the Rivers State Government, in Nigeria. It serves as a primary and tertiary care centre for the state as well as a referral centre for all the 23 Local Government areas of the state. It also offers free medical services for all children 0-5 years and pregnant women.

The SCBU of the hospital comprises an inborn ward and an outborn ward. Babies whose mothers were booked in BMSH or in any of the health centers owned by the State Government and delivered in BMSH are admitted into the inborn wards. All other babies are admitted into the out born ward.

All babies with low Apgar scores, less than six at one minute and whose parents/caregivers gave consent for inclusion into the study were recruited consecutively during the period of study. For outborn babies with no Apgar score recording, a history of poor cry from birth with either of the following; poor colour, respiratory distress, floppiness and loss of primitive reflexes were used.<sup>9</sup> The total number of live births for the hospital within the period was obtained from the obstetric registers in the labour room.

Other relevant data which were obtained included the age, sex, birth weight, gestational age of recruited babies, parity, booking status, mode of delivery, place of delivery, fetal presentations as well as problems during pregnancy, labour and delivery in the mothers. The hospital based incidence of perinatal asphyxia was calculated using the number of babies with perinatal asphyxia born in the BMSH and total number of live births in the hospital during the period of study.

Data was arranged in frequency tables and analysed using the statistical software SPSS version 17.0 and Epi-info version 6.04. Analysis of variance was used to compute means, ranges and standard deviations of continuous variables. Data were presented as tables in simple proportion and comparison of subgroups carried out with Chi-Square ( $\chi^2$ ) statistics. The statistical significance at 95% confidence interval was  $p < 0.05$ .

## Results

### *Characteristics of the Study Population*

A total of 630 neonates (338 males and 292 females) were admitted into the SCBU, during the period, of which 157 had perinatal asphyxia, giving a prevalence rate of 24.9%. Of the 338 male neonates admitted into the SCBU, 88 (26.0%) had perinatal asphyxia while of 292 females admitted, 69 (23.6%) had perinatal asphyxia with a M:F ratio of 1.3:1. There was no significant difference in the incidence of perinatal asphyxia in both sexes ( $p$  value = 0.486).

The age on admission ranged between less than one hour and 192hours with a median age of 24.0 hours. The mean birth weight of babies with perinatal asphyxia was

$3.0 \pm 0.9\text{kg}$  (0.7- 5.6kg) while the mean gestational age was  $36.84 \pm 3.67\text{weeks}$  (24 – 44weeks).

Apgar score recording of 4-5 at one minute (moderate perinatal asphyxia) was observed in 107 (68.2%) neonates, 38 (24.2%) had Apgar score 0-3 at one minute (severe perinatal asphyxia) while 12 (7.6%) did not have any Apgar score recording. Of 157 neonates with perinatal asphyxia 142(90.4%) were inborn while 15(9.6%) were outborn. There were 2255 live birth during the period of study giving a hospital base incidence rate of perinatal asphyxia in BMSH as 63.0 per 1000 live births. Of 2255 babies delivered to 2252 mothers, 2249 (99.7%) babies were of singleton gestation while 6 (0.3%) of multiple gestation (3 sets of twin deliveries). Of the 2252 deliveries during the study period, 1464 (64.9%) were referred cases, of which 1389 (94.9%) had obstetric complications.

Ninety five (60.5%) mothers of babies with asphyxia had antenatal care: BMSH and affiliated Government Health Centres (80; 84.2%) and private hospitals (15; 15.8%) while 62 (39.5%) did not receive any form of antenatal care. Majority of the mothers of infants with perinatal asphyxia (140; 89.2%) were between the ages of 21-35 years. . Ninety eight (62.4%) were delivered by caesarean section, 56 (35.7%) by spontaneous vaginal delivery and 3 (1.9%) were instrumental deliveries. Of the 98 infants delivered by caesarean section, 80 (81.6%) were by emergency caesarean sections. Perinatal asphyxia was observed most in infants with breech presentation 79 (50.3%) followed by infants with cephalic presentation, 73 (46.9%) and face 5 (3.2%).

### *Observed Risk Factors for Perinatal Asphyxia*

There were 221 episodes of observed risk factors of which 120 (54.3%) were maternal and 101 (45.7%) were fetal risk factors. The maternal, fetal and maternofetal risk factors of perinatal asphyxia are shown in Table 1. The commonest fetal risk factor observed in neonates with perinatal asphyxia was abnormal presentation. Can we rephrase this last sentence as: The commonest risk factor observed in neonates with perinatal asphyxia was abnormal presentation (fetal risk factor).

**Table 1:** Observed Risk Factors for Perinatal Asphyxia

Risk Factors	AS>3		AS<3		NO AS		p-value
	Total=107		Total=38		Total=12		
	No	%	No	%	No	%	
<i>Maternal Factors</i>							
Cephalopelvic disproportion	32	29.9	9	23.7	2	18.2	0.606
Hypertension	16	15.0	8	21.1	0	0.0	0.220
Prolonged Labour	13	12.1	7	18.5	3	27.3	0.286
Prolonged Rupture of membranes	9	8.4	4	10.5	1	9.1	0.897
Peripartum pyrexia	4	3.7	2	5.3	0	0.0	0.778
Diabetes mellitus	1	0.9	0	0.0	0	0.0	1.000
<i>Fetal</i>							
Abnormal presentation	54	50.5	24	63.2	6	50.0	0.409
<i>Maternofetal</i>							
Meconium stained liquor	8	7.5	6	15.8	0	0.0	0.229
Antepartum haemorrhage	4	3.7	2	5.3	0	0.0	0.778
Prolapsed/ compressed cord	3	2.8	0	0.0	0	0.0	0.653
Precipitate delivery	2	1.9	1	2.6	0	0.0	1.000

### Clinical Features of neonates with Moderate and Severe Perinatal Asphyxia

The clinical features of infants with moderate and severe perinatal asphyxia are shown in Table II. Respiratory distress and depressed neonatal reflexes were the commonest clinical features observed in neonates with both moderate and severe perinatal asphyxia while loss of consciousness was the least. Abnormal tone, convulsion, poor suck and apnea were significantly observed more in infants with severe perinatal asphyxia than infants with moderate perinatal asphyxia.

**Table 2:** Clinical Features of Neonates with Moderate and Severe Perinatal Asphyxia

Clinical Features	AS>3		AS<3		No AS		p-value
	Total=107		Total=38		total=12		
	No	%	No	%	No	%	
Respiratory distress	73	68.2	28	73.7	9	81.8	0.563
Depressed neonatal reflexes	53	49.5	19	50.0	6	54.5	1.000
Poor suck	11	10.3	8	21.1	6	54.5	0.001
Hypotonia	9	8.4	9	27.7	4	36.4	0.006
Absent neonatal reflexes	9	8.4	8	21.1	2	18.2	0.108
Convulsion	4	3.7	5	13.2	5	45.5	0.000
Apnea	4	3.7	6	15.8	0	0.0	0.041
Lethargy	4	3.7	1	2.6	0	0.0	1.000
Irritability	2	1.9	1	2.6	0	0.0	1.000
Hypertonia	1	0.9	2	5.3	3	27.3	0.001
Loss of consciousness	1	0.9	1	2.6	3	27.3	0.002

Thirty nine babies (24.8%) had features of Hypoxic ischaemic encephalopathy(HIE). Of these, 16 (15.0%) had AS >3, 16 (42.1%) had AS < 3 while 7 (58.3%) had no AS recorded. There was a statistically significant association between Apgar scores and severity of HIE (p=0.000).

### Outcome of Perinatal Asphyxia

Table 3 shows the outcome of neonates with moderate and severe perinatal asphyxia. Of 107 neonates with moderate perinatal asphyxia, 90 (84.1%) were discharged and 14 (13.1%) died while of 38 neonates with severe perinatal asphyxia, 25 (65.8%) were discharged and 12 (31.6%) died ( $\chi^2=6.74$ , p value = 0.034).

**Table 3:** Outcome of Perinatal Asphyxia

Apgar score	Discharged		DAMA		Died	
	No	(%)	No	(%)	No	(%)
AS > 3	90	84.1	3	2.8	14	13.1
AS ≤ 3	25	65.8	1	2.6	12	31.6
No AS	9	75.0	0	0	3	25.0

Of the 39 neonates with HIE, 21(53.8%) were discharged, 17 (43.6%) died while 1(2.6%) discharged against medical advice (DAMA) (p=0.000).

### Discussion

Perinatal asphyxia occurs worldwide and contributes significantly to neonatal morbidity and mortality with very high incidence in developing countries.

The incidence of perinatal asphyxia in this study is 63/1000 live births. This figure is very high when compared with an incidence of 1-8/1000 live births observed in the US and other technically developed countries.<sup>10</sup> It however compares favorably with figures in other centers around the country and Africa. These figures remain high when compared with a report by authors several years ago.<sup>11</sup> This was also noted in a study done in Ilesha, Nigeria, where authors compared the incidence of birth asphyxia over two time periods ten years apart and concluded that the incidence and severity of birth asphyxia remained high despite changes in the social order.<sup>12</sup> This suggests that while there are improvements in developed societies in terms of obstetric and neonatal

care, there is a slow change in the prevailing circumstances in developing countries. This has grave implications for achieving the Millennium Development Goals.

Although in some studies,<sup>5, 13-15</sup> asphyxia was more prevalent in males than females, similar to the study by Nayeri et al,<sup>16</sup> there was no significant difference in incidence of perinatal asphyxia in this study in terms of gender.

Birth asphyxia was common in good sized babies with a mean birth weight of 3kg . This trend has also been observed by other researchers<sup>13</sup> and has been attributable to poor perinatal services in maternity homes and hospitals. It is also pertinent to add that even where services are available, they may not be utilized .

Over 90% of the babies with birth asphyxia were born in BMSH which is a specialist hospital. This finding contrasts sharply with other findings which report a lower incidence in babies delivered in specialist/tertiary hospitals.<sup>17</sup> However, as many as 39.5% of the mothers whose babies were asphyxiated did not receive any form of ANC, whilst some of those who received ANC did so in less specialized hospitals. Over 90% of the mothers referred to the centre had complications of pregnancy or labour, thus increasing the risks of perinatal asphyxia. It can also be postulated as it is common in women in this region that even those who receive ANC in specialized centres may at time of delivery opt for other places only to return with complications. Lack of ANC has been associated with increased incidence of birth asphyxia in several studies.<sup>17,18</sup>

More than half of the babies were delivered by caesarian section, most of which were by emergency caesarian sections (EMCS), many of them done during labour. This implies that there were already peri-partum complications. High rates of EMCS have been reported in other Nigerian studies.<sup>19-21</sup> Previous studies have shown that significantly more mothers of babies with birth asphyxia than of controls were delivered by emergency Caesarian section.<sup>16,22</sup> There is an aversion to CS deliveries in our environment.<sup>23- 24</sup> Non-vaginal delivery is generally viewed as a sign of maternal laziness, reproductive failure or a curse from perceived enemies.<sup>25</sup> It is therefore not uncommon that even women booked for elective caesarean sections often abscond, attempt vaginal delivery and only return when an emergency CS is inevitable. This aversion to caesarian deliveries, inevitably increases the risk of perinatal asphyxia and buttresses the fact that a properly trained person in neonatal resuscitation preferably a Paediatrician should be present at every delivery especially the high risk ones. Presence of working resuscitation equipment e.g. suction, proper size ambu bags, endotracheal tubes, neonatal laryngoscopes and oxygen supply should be made mandatory. The availability of these facilities were not explored in the study.

Perinatal asphyxia was also observed most among babies who had breech presentation. Increased risk of perinatal asphyxia in babies with non-cephalic presentation has been reported in other studies.<sup>16</sup> Infants presenting breech have long been well known to encounter greater hazards during the process of delivery with greater incidence of birth asphyxia, birth trauma and death irrespective of mode of delivery.<sup>25-27</sup> This may be because fetuses presenting breech are more likely to have other associated problems like cord around the neck or even congenital anomalies which also predispose them to perinatal asphyxia.

Other risk factors observed in this study included prolonged rupture of membranes, peripartum pyrexia, and haemorrhage. All of these have also been reported by other authors.<sup>17</sup>

Most of the clinical features of birth asphyxia seen in this study have been well documented. Of these, poor suck, convulsion, abnormal tone and apnoea were noted to be most commonly associated with increasing severity of asphyxia. Respiratory distress was observed in more than a third of newborns with both moderate and severe birth asphyxia. This may be related to the underlying hypoxemia and acidosis observed in such babies.<sup>28</sup> This study also showed a statistically significant relationship between Apgar score and the occurrence of hypoxic ischaemic encephalopathy. workers comparing the Apgar scoring system with umbilical artery pH in predicting neonatal death concluded that the Apgar Score has remained as relevant as it was several years ago, for the prediction of neonatal survival.<sup>29</sup>

Case fatality rate was higher in severely asphyxiated infants. This supports findings by other workers which show a higher risk of death with very low Apgar scores.<sup>29</sup> This study showed an overall case fatality rate of 16.6% which was slightly lower than that in other Nigerian studies. The main difference being that some studied only severely asphyxiated infants while our study included babies with moderate asphyxia.

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## Conclusion

Prevalence of perinatal asphyxia is high. Lack of ANC, CPD and breech presentation were contributory factors. There is urgent need for maternal education on need for ANC, early intervention and skilled care of babies at birth.

## Authors' contributions

West BA: Conception, design and data analysis  
Opara PI: literature review and drafting of the manuscript

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