

RISK FACTORS AND MORTALITY RATE OF SEVERELY ASPHYXIATED NEONATES IN A TERTIARY CENTRE IN NORTH- CENTRAL NIGERIA

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ABSTRACT

Introduction: Asphyxia is a serious clinical condition in which placental or pulmonary gas exchange is impaired or ceases altogether. Reports from Nigeria have shown that a large proportion of neonates are still being diagnosed with and managed for severe birth asphyxia. A large proportion of the risk factors are actually preventable

Aim: The study was carried out to determine the maternal and foetal risk factors for the occurrence of severe birth asphyxia and the mortality rate of babies affected with this condition.

Method: Records of all neonates with severe birth asphyxia admitted into the special care baby unit (SCBU) of the Jos university teaching hospital (JUTH) in 2011 were obtained retrospectively and information documented in a questionnaire. 25 other neonates matched for birth weight who were not asphyxiated were selected randomly and constituted the controls. Data was analysed using statistical soft ware EPI-info version 3.5.1. Chi- square test was used for comparison of categorical variables while the T test was used to compare means. A P value of < 0.05 was considered significant.

Results: Fifty (12.6%) of the 398 babies admitted into the SCBU in 2011 were severely asphyxiated. The severely asphyxiated infants were admitted at a significantly earlier age compared to babies without asphyxia P value <0.001. All (100.0%) mothers of the control group and 98.0% of the cases booked for antenatal care. A significantly higher number of mothers whose babies had SBA were multiparous, had prolonged labour or meconium staining of liquor P values 0.015, 0.004 and 0.035 respectively.. Hypertension including pre- eclampsia, prolonged rupture of membranes, antepartum haemorrhage and precipitate labour were not significant risk factors for severe birth asphyxia in this study. Neonatal jaundice was significantly less common in the cases (52.0%) compared with the controls (76.0%) P value = 0.046. Necrotizing enterocolitis and neonatal sepsis occurred more commonly in cases and the difference tended towards significance P value of 0.05 in both cases. The mortality rate of babies with SBA in this study was 28.0% which was significantly higher than in the control group - P value = 0.03.

Conclusion: The mortality rate from severe birth asphyxia is high, improving intrapartum care services would help reduce the occurrence of SBA in our environment.

INTRODUCTION

Asphyxia is a serious clinical condition in which placental or pulmonary gas exchange is impaired or ceases altogether. Birth Asphyxia has remained a major cause of morbidity and mortality worldwide. The World Health Organization estimates that 3% of all infants (3.6millions) in developing countries suffer from moderate to severe birth asphyxia, of which 23% (840,000) die and approximately the same number develop serious sequelae. As a result, increased global

efforts have been targeted towards reducing the burden of severe birth asphyxia in the past few decades.

Reports from Nigeria have shown that a large proportion of neonates are still being diagnosed with and managed for severe birth asphyxia (SBA). In the University of Portharcourt Teaching Hospital (UPTH), an incidence of 45/1000 live birth was recorded over a period of 5 months. Ogunlesi and Oseni in Ilesha, south west Nigeria, noted an

increase in the incidence of SBA cases recorded in 1994 to 1998 when compared to that between 1999 and 2003 (93.7/1000 vs. 102/1000 respectively).

The most disturbing aspects of these studies is that a large proportion of the risk factors such as the place of birth, the level of prenatal care received, and events during pregnancy and delivery, are actually preventable. In the light of these, risk assessment of severe birth asphyxia is crucial as a means of prevention.

This study was carried out to determine the maternal and foetal risk factors for the occurrence of severe birth asphyxia and the mortality rate of babies affected with this condition. In addition, the study sought to determine the co-morbidities that are associated with severe birth asphyxia.

MATERIALS AND METHODS:

This was an observational study where the identification of risk factors for SBA was carried out by a retrospective comparison of the cases and controls. Records of all neonates with severe birth asphyxia (cases) admitted into the special care baby unit (SCBU) of the Jos university teaching hospital (JUTH) from the 1st of January to the 31st of December 2011, were obtained and information documented in a questionnaire. Random selection of 25 other neonates admitted into the SCBU who were not asphyxiated were matched for birth weight and constituted the controls.

The parameters studied were: gestational age and age at presentation, type and place of delivery, birth weight, antenatal care, pregnancy and peripartum complications, maternal occupation and educational status, neonatal comorbidities and outcome in relation to death, discharge or leaving against medical advice. Data was analysed using statistical soft ware EPI-info version 3.5.1. Chi-square test was used for comparison of categorical variables while the T test was used to compare means, and P values calculated to assess the risk factors and outcome of babies. A P value of < 0.05 was considered significant.

RESULTS

Fifty (12.6%) of the 398 babies admitted into the SCBU in 2011 were severely asphyxiated. The mean gestational age was lower in the SBA babies when compared with the controls (37.6±5.7 weeks vs 39.3±1.6 weeks) and this tended towards significance P value 0.06. There was no difference in the mean anthropometric measurements birth weight, length and occipitofrontal circumference

(OFC), of the cases and controls. The severely asphyxiated infants were admitted at a significantly earlier age compared to babies without asphyxia. The mean duration of hospital stay was longer in cases compared with the controls (256.4±185.9 hours vs 204.5±131.6 hours). This difference was however not statistically significant Table I.

Table I: Mean age and anthropometric parameters in Cases and Controls

Parameters	SBA mean±SD	No SBA mean±SD	T test	P value
Gestational age in weeks	37.6±5.7	39.3±1.6	3.4	0.06
Age at admission in hours	35.0±84.3	88.6±87.5	19.0	<0.0001*
Duration of hospital stay	256.4±185.9	204.5±131.6	1.2	0.22
Birth weight	3.09±0.6	3.01±0.4	2.1	0.15
<2.5Kg- no (%)	7(14.0)	1(4.0)		
2.5-3.9Kg - no(%)	40(80.0)	22(88.0)		
≥4.0Kg - no(%)	3(6.0)	2(8.0)		
Birth length	49.5±4.5	47.6±4.3	1.4	0.16
OFC	34.9±2.1	34.6±1.2	1.5	0.20

*Statistically significant

The stratified age distribution of the mothers was similar for both the cases and controls. Twenty percent of the mothers of babies that made up the control group did not have their occupations documented in their folders and hence comparison of the two groups was not possible. This also applied to the educational level of the mothers. All (100.0%) mothers of the control group and 98.0% of the cases booked for antenatal care. Although more mothers of severely asphyxiated babies booked in primary and secondary health care facilities, there was no statistically significant difference in the level of antenatal care P value = 0.2. A significantly higher number of mothers whose babies had SBA were multiparous (78.0%) when compared with the controls (48.0%) Table II.

Table II: Demographic and Clinical Characteristics Mothers of Cases and Controls

Characteristics	No (%)	No (%)	chi square	P value
Maternal age				
<18 years	3 (6.0)	1(4.0)		
18-35 years	42 (84.0)	20(80.0)		
>35 years	5 (10.0)	4(16.0)	0.66	0.72
Maternal occupation				
Unskilled worker	34 (78.0)	12 (48.0)		
Skilled worker	13 (26.0)	7 (28.0)		
Professional	1 (2.0)	1 (4.0)		
Not stated	2 (4.0)	5 (20.0)		
Level of education				
Primary	14 (28.0)	2(8.0)		
Secondary	18(36.0)	10 (40.0)		
Tertiary	16(32.0)	10(40.0)		
Not stated	2(4.0)	3(12.0)		
Antenatal care				
Booked	49 (98.0)	25 (100.0)		
PHC	7 (14.3)	1 (4.0)		
Secondary	7 (14.3)	2 (8.0)		
Tertiary	23 (46.9)	16 (64.0)		
Private	12 (24.5)	6 (24.0)		
Unbooked	1 (2.0)	0 (0.0)	0.67	1.00
Parity				
Primipara	6 (12.0)	10 (40.0)		
Multiparous	39 (78.0)	12 (48.0)		
Grand multiparous	5 (10.0)	3 (12.0)	8.39	0.015
Gestation				
Preterm	7(14.0)	1(4.0)		
Term	39(78.0)	21(84.0)		
Post term	4(8.0)	3(12.0)	1.92	0.38
No of Foetuses				
Singleton	45 (90.0)	24 (96.0)		
Multiple	5 (10.0)	1 (4.0)	0.34	0.66

More severely asphyxiated babies were born outside JUTH (42.9%) compared with 24.0% of the controls but difference was not statistically significant P value = 0.13. Prolonged labour and meconium staining of liquor was significantly more common in mothers of severely asphyxiated neonates occurring in 32.0% and 16.0% respectively as opposed to 0.0% and 4.0% respectively in controls. The distribution in relation to the mode of delivery was similar in both cases and controls P value 0.71. Hypertension including pre- eclampsia, prolonged rupture of membranes, antepartum haemorrhage and precipitate labour were not found to be significantly more common in mothers of severely asphyxiated babies in this study - Table III.

Table III: Maternal Risk Factors for Severe Birth Asphyxia

Risk factors	SBA	No SBA	Statistical test	P value
Place of delivery				
Inborn	29(58.0)	19(76.0)		
Outborn	21(42.9)	6(24.0)	2.34 ^x	0.13
Mode of delivery				
Caesarian section	14(28.0)	6(24.0)		
Vaginal delivery	36(72.0)	19(76.0)	0.14 ^x	0.71
Hypertension (including pre- eclampsia)				
Yes	8(16.0)	1(4.0)		
No	42(84.0)	24(96.0)	0.07 ^x	0.13
Prolonged rupture of membranes				
Yes	36(72.0)	22(88.0)		
No	14(28.0)	3(12.0)	2.4 ⁻	0.12
Meconium stained liquor				
Yes	8 (16.0)	1(4.0)		
No	42(84.0)	24 (96.0)	0.02 ^x	0.035*
Antepartum haemorrhage				
Yes	4(8.0)	1(4.0)		
No	46(92.0)	24(96.0)	0.45 ⁻	0.66
Prolonged labour				
Yes	16 (32.0)	0 (0.0)		
No	34(68.0)	25(100.0)	8.35	0.004*
Precipitate labour				
Yes	4 (8.0)	0 (0.0)		
No	46(92.0)	25(100.0)	0.18	0.29

^x Chi square ⁻Fisher exact *Statistically significant

Neonatal jaundice was significantly less common in the cases (52.0%) compared with the controls (76.0%) P value = 0.046. Necrotizing enterocolitis and neonatal sepsis occurred more commonly in cases and the difference tended towards significance P value of 0.05 in both cases. The occurrences of hypoglycaemia and hyperglycaemia though slightly higher in the cases, were not significant statistically Table IV.

Table IV: Clinical morbidities in Cases and controls

Complications	SBA	No SBA	Statistical test	P value
Neonatal sepsis				
Yes	42(84.0)	16(64.0)		
No	8(16.0)	9(36.0)	3.8 ⁻	0.05
Neonatal jaundice				
Yes	26(52.0)	19(76.0)		
No	24(48.0)	6(24.0)	4.00 ⁻	0.046*
Hypoglycaemia				
Yes	44(88.0)	23(92.0)		
No	6(12.0)	2(8.0)	0.32 ^x	0.46
Hyperglycaemia				
Yes	2(4.0)	0(0.0)		
No	48(96.0)	25(100.0)	0.22 ^x	0.44
Necrotizing enterocolitis				
Yes	7(14.0)	0(0.0)		
No	43(86.0)	25(100.0)	0.025 ^x	0.05

^x Chi square ⁻Fisher exact *Statistically significant

14 (28.0%) of the 50 neonates with SBA died compared with only one (4.0%) control and this difference was significant statistically P value = 0.03. Though more babies with SBA left against medical advice, the difference was not significant statistically Table V.

Table V: Outcome of Cases and controls

Outcome	SBA	No SBA	Statistical test	P value
Discharged	29(58.0)	23(92.0)	7.53 ^x	0.006*
Left against medical advice	7(14.0)	1(4.0)	0.18 ⁻	0.26
Died	14 (28.0)	1(4.0)	4.59 ⁻	0.03*

^x Chi square ⁻Fisher exact *Statistically significant

DISCUSSION

This study analyzed the risk factors and outcome (discharge, death and leaving against medical advice) of severely asphyxiated babies admitted in JUTH. It is clear that SBA is still an important cause of neonatal morbidity and mortality in Jos accounting for 12.6% of admissions in the year 2011 with a mortality rate of 28.0%.

Eighty percent (80.0%) of severely asphyxiated babies in this study had a normal birth weight and 6.0% were macrosomic. This finding is similar to previous studies and supports the fact that larger babies are more likely to be associated with cephalo- pelvic disproportion and consequently, prolonged or obstructed labour.³ Severely asphyxiated infants were admitted at an earlier age which is similar to Shireen's study. This is because the condition occurs at birth and its clinical features which usually are life threatening, become evident shortly after birth thus necessitating early admission.

Maternal age did not show any association with severe birth asphyxia and this finding is consistent with previous studies.¹⁰ Isolated maternal age may therefore not be a risk factor for severe birth asphyxia.¹¹ In contrast to other studies, most (98.0%) mothers of severely asphyxiated babies in the present study booked and attended regular follow- up visits.³ This indicates that there is a high awareness on the need for utilizing antenatal care services in our society. This however did not show any significant impact in relation to the occurrence of severe birth asphyxia in their babies. Several factors may limit provision of efficient care during visits and include large number of clients, long waiting time, staff turnover and little or no feedback or communication. More emphasis therefore should be on focused antenatal care delivery and identification of these high risk pregnancies early in

pregnancy and prompt referral of these pregnancies to tertiary institutions.¹⁴

Significantly more mothers of severely asphyxiated babies were multiparous which is in contrast with previous reports by several authors which showed a higher prevalence in babies born to primiparous women. This may reflect the high utilization of antenatal care facilities by primiparous women in our society as opposed to other studies.^{3,10} also, multiparous women may be presenting later in labour compared to the primiparous women.

Meconium stained liquor and prolonged labour were the two significant labour- related risk factors for severe birth asphyxia in this study. Prolonged labour which has also been reported by various researchers as a risk factor for SBA,^{3,15} is associated with foetal and maternal exhaustion and also foetal distress which results in birth asphyxia. Proper management of labour to reduce prolonged labour/ with earlier intervention may reduce the incidence of severe birth asphyxia. Meconium stained liquor is associated with exaggerated foetal respiration and meconium aspiration in- utero or immediately after birth resulting in birth asphyxia. The presence of meconium stained liquor is therefore a red flag which should prompt closer monitoring of women with this condition.

Neonatal jaundice was significantly less common in severely asphyxiated babies in present study. All babies managed for SBA in this study were given phenobarbitone, a drug which has been evaluated and shown to be effective in lowering serum bilirubin levels. This drug may therefore be responsible for a significantly lower prevalence of neonatal jaundice in babies with SBA.

Neonatal sepsis and necrotizing enterocolitis were more common in SBA babies in the present study. An association between sepsis in a term foetus, deterioration in acid- base balance and prolonged labour has been shown. Hence, babies with SBA are likely to be septic in- utero. Also, the vigorous resuscitation may be an extended risk factor for sepsis in these babies. SBA is also a known risk factor for necrotizing enterocolitis as it leads to intestinal ischaemia, one of at least two pathologic events necessary for its development.

Mortality was significantly higher in SBA babies compared with controls with a death rate of 28%. This high mortality is similar to findings in previous studies indicating that SBA is still an important cause of neonatal mortality.¹³

CONCLUSION

The study found that prolonged labour and meconium stained liquor were significant maternal risk factors for SBA. Improving intrapartum care services, preventing prolonged labour by early presentation and early intervention, and early identification of women with meconium stained liquor with closer monitoring of such women in labour would help reduce the occurrence of SBA. The mortality rate of SBA is high. Efforts to reduce deaths in babies with SBA are possible if factors that contribute to mortality are studied and strategies put in place to improve survival in these babies.

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