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Maternal factors associated with birth asphyxia at the University Teaching Hospitals, Lusaka, Zambia

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Abstract

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Background: Birth asphyxia is associated with significant perinatal complications. The World health organization (WHO) estimates that 3% of neonates born each year develop asphyxia and need resuscitation (WHO 2016). Because of the paucity of data and enormous magnitude of birth asphyxia, available figures are likely to underestimate the proportion of the problem (WHO 2016). Research is needed to estimate the contribution of birth asphyxia to perinatal morbidity and mortality at the University Teaching Hospital (UTH), Lusaka, Zambia.

Methodology: A case control study comprising 72 newborns from labour ward with birth asphyxia (Apgar score <7) (n=72) and 125 well newborn presenting to the postnatal ward and having been delivered within UTH from 1st November 2015 to January 2016 was conducted. A questionnaire was used to collect data along with medical records of the newborn. A multiple logistic regression model was used to assess the association of maternal obstetric conditions and birth asphyxia while controlling for confounders.

Results: Of the 197 patients enrolled, 72 had birth asphyxia of which 37 were born with mild birth asphyxia (Apgar score 4-6) while 35 were born with severe birth asphyxia (Apgar score 1-3). Neonates delivered by spontaneous vaginal delivery had 88% reduced odds for birth asphyxia [Odds Ratio (OR) 0.12, 95% Confidence Interval (CI) 0.05 – O.31, P- value< 0.01]. Neonates with birth weight between 2500-3500g had on average 96% reduced odds ratio for birth asphyxia (OR 0.04, 95% CI 0.02-0.11, P- value < 0.01) compared to neonates with birth weight above 3500g. Compared to newborn of mothers with parity greater than four, neonates born of mothers with parity=1 had on average 79% reduced 0dds for birth asphyxia (OR 0.21, CI 0.07-0.70, P-value=0.01). Neonates born of mothers with parity between 2 and 4 had on average 96% reduced odds (OR 0.04, 95% CI 0.01 – 0.12, P- value < 0.01).

Conclusion: High parity and newborn with birth weight >3500g were associated with birth asphyxia. Marital status and education level did not increase the risk of birth asphyxia in the population studied.

Keywords: *birth asphyxia, maternal factors, parity, labor*

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INTRODUCTION

Birth asphyxia is a significant contributor to newborn morbidity and mortality as well as long term neurological deficits. It has remained a common problem in the developing world. In the short-term asphyxia could lead to multi organ dysfunction or even death was as in the long term, childhood survivors of neonatal hypoxic-isqeamic encephalopathy may develop cerebral palsy; developmental delay; visual, hearing and intellectual impairment; and learning and behavioral problems. The nature of the disease as one affecting the newborn during a critical time window, and its sequelae, means that huge difficulties are placed on the family who have to find ways to cope with this tragedy on a daily basis [1] The direct costs and burden of disease imposed on societies around the world are alarming [2].

Globally, asphyxia accounts for 23% of neonatal deaths and 8% of under five deaths. In a study in Sweden on the influence of maternal, obstetric and foetal risk factors on the prevalence of birth asphyxia found an association between neonatal asphyxia and operative delivery, and single civil status [3] . A multicenter prospective trial conducted in 2006 across eight hospitals in East, Central and Southern Africa found labor related problems such as prolonged labor and fetal distress to be important causes of birth asphyxia. However, this trial did not look at the maternal factors that could have been associated with birth asphyxia. In Zambia, a cross sectional study was conducted at UTH and found the prevalence of birth asphyxia to be at 43/1000 births in term infants [4]. In this study birth asphyxia was associated with maternal age, instrumental delivery and meconium release.

Information regarding maternal factors associated with birth asphyxia is scanty however anecdotal observations and information obtained from birth records of term deliveries at University Teaching Hospitals in Zambia (UTH) between 1st October and 31st December 2014 shows that out of the 4739 deliveries 236 babies were admitted to the neonatal intensive care unit with birth asphyxia. Information obtained at a combined perinatal meeting held between the department of obstetrics and gynecology at the University Teaching Hospital held in 1998 appeared to suggest that the incidence of birth asphyxia was high with term babies contributing a good proportion of it. (Phiri et al 2001). This study endeavored to elucidate the maternal risk factors associated with birth asphyxia at UTH.

MATERIALS AND METHODS

A cross sectional study comprising 72 newborns from labor ward with birth asphyxia (Apgar score <7) (n=72) and 125 well newborn presenting to the postnatal ward and having been delivered within UTH from 1st November 2015 to January 2016 was conducted. A questionnaire was used to collect data along with medical records of the newborn. A multiple logistic regression model was used to assess the association of maternal obstetric conditions and birth asphyxia while controlling for confounders

RESULTS

Of the 197 patients enrolled, 72 had birth asphyxia of which 37 were born with mild birth asphyxia (Apgar score 4-6) while 35 were born with severe birth asphyxia (Apgar score 1-3). Neonates delivered by spontaneous vaginal delivery had 88% reduced odds for birth asphyxia [Odds Ratio (OR) 0.12, 95% Confidence Interval (CI) 0.05 – O.31, P- value< 0.01]. Neonates with birth weight between 2500-3500g had on average 96% reduced odds ratio for birth asphyxia (OR 0.04, 95% CI 0.02-0.11, P- value < 0.01) compared to neonates with birth weight above 3500g. Compared to newborn of mothers with parity greater than four, neonates born of mothers with parity=1 had on average 79% reduced 0dds for birth asphyxia (OR 0.21, CI 0.07-0.70, P-value=0.01). Neonates born of mothers with parity between 2 and 4 had on average 96% reduced odds (OR 0.04, 95% CI 0.01 – 0.12, P-value < 0.01).

Table 1: Bivariate analysis for predicting birth asphyxia

Variable	No Asphyxia		Asphyxia		P-value
	n	%	N	%	
No. of visits					
1-3	71	56.8%	45	62.5%	0.43[c]
4+	54	43.2%	27	37.5%	
Reason attending ANC at hospital					
Personal preference/Other	36	46.2%	16	39.0%	0.69[c]
Obstetric condition	29	37.2%	16	39.0%	
Medical condition	13	16.7%	9	22.0%	
Reason delivering at UTH					
Booked	32	25.6%	18	25.0%	<0.01[c]
Referred	56	44.8%	54	75.0%	
Personal preference	37	29.6%	0	0.0%	
Reason for being referred to UTH					
Obstetric condition	35	62.5%	30	55.6%	0.71[c]
Medical condition	9	16.1%	9	16.7%	
Others	12	21.4%	15	27.8%	
Mode of delivery					
SVD	95	76.0%	30	41.7%	<0.01[c]
C/s	30	24.0%	42	58.3%	
Indication for caesarean					
Medical condition	22	73.3%	15	35.7%	<0.01[c]
Obstetric condition	8	26.7%	27	64.3%	
Birth weight					
2.5Kg-3Kg	59	47.2%	5	6.9%	<0.01[c]
3.1Kg-3.5Kg	48	38.4%	15	20.8%	
3.6Kg-4Kg	18	14.4%	22	30.6%	
4.1Kg and above	0	0.0%	30	41.7%	

(Table. 2) Neonates born by SVD had on average and 88% reduced odds ratio for birth asphyxia. Babies that were born by caesarean section were more likely to be born asphyxiated. This could have been because most babies born by caesarean section weighed more than 3.5kg. Older age and birth weight more than 3.5kg was associated with birth asphyxia. When the backward selection method was applied to the variables in the logistic regression model, the final model only included mode of delivery, birth weight and parity as the variables independently associated with asphyxia.

Table 2: Logistic regression analysis predicting birth asphyxia

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P-Value
Mode of delivery			
C/s	1	1	
SVD	0.23 (0.12 - 0.42)	0.12 (0.05 - 0.31)	< 0.01
Birth weight			
3.6 Kg and above	1	1	
2.5 Kg - 3.5 Kg	0.07 (0.03 - 0.13)	0.04 (0.02 - 0.11)	< 0.01
Parity			
5+	1	1	
1	0.70 (0.33 - 1.48)	0.21 (0.07 - 0.70)	0.01
2-4	0.18 (0.08 - 0.37)	0.04 (0.01 - 0.12)	< 0.01

DISCUSSION

The data collected was only for mothers who delivered singleton term infants with a birth weight of 2.5kg or more. As such it was not possible to make comparison with all deliveries at UTH.

In the bivariate analysis the number of antenatal visits was not significantly associated with birth asphyxia. These findings are similar to a study done in Zimbabwe that found that the absence of antenatal care was not a significant risk of low Apgar scores. A similar study done in Zambia found the antenatal attendance to be rather high among women who delivered asphyxiated babies [4-7]. This study recommended that the emphasis on antenatal care should have been on quality rather than quantity alone. These findings are interesting as generally, low attendance of antenatal has been associated with poor pregnancy outcomes.

Residential address was marginally associated with birth asphyxia with 66.7% of mothers delivering asphyxiated babies coming from high density residential areas and 9.7% of mothers coming from low density residential areas. A study in Sweden found single civil status to be associated with birth asphyxia [8]. Low socioeconomic status was highly associated with birth asphyxia in another study done in Southern Nepal [9]. However, a study by Phiri et al done at the UTH could not determine the effect of low socio-economic status on birth asphyxia. Referral to UTH or attending antenatal at UTH was not associated with birth asphyxia.

Obstetric conditions such as big babies and prolonged labor were associated with birth asphyxia. 64.3% of mothers with obstetric conditions delivered babies with asphyxia. A multi-center study on birth asphyxia in East and Central Africa found that obstetric factors such as prolonged labor and abnormal presentation contributed to birth asphyxia [10]. Another study involving all deliveries in chief hospitals in 8 countries of Eastern, Central and Southern Africa, the leading obstetric risk factors for asphyxia were prolonged labor and cephalopelvic disproportion.

Parity was also associated with birth asphyxia with 45.8% of mothers with parity of 5 and above delivering asphyxiated babies. Similar findings were recorded in a case control study done in Western Australia [11] (Badawi et al 1998). Different findings were however recorded in a prospective study of all deliveries in Central, Eastern and Southern Africa with asphyxia being more common in primigravida.

It can be concluded that birth asphyxia is a common cause of admission to neonatal intensive care units. Several factors have been associated with an increased risk of birth asphyxia, including low birth weight, young maternal age, and preterm delivery. Neonates born by caesarean section have been found to have a higher risk of birth asphyxia compared to those born by spontaneous vaginal delivery, which may be due to the higher birth weight of babies delivered by caesarean section. Additionally, older age and birth weight more than 3.5kg have been associated with birth asphyxia. The prevalence of birth asphyxia varies across different studies, ranging from 10.6% to 22.4%. It is important for health professionals to have adequate knowledge and skills in neonatal resuscitation to prevent and manage birth asphyxia [12,13,14].

There should be a best policy practice around factors associated with maternal health and that are targeted at such important spectrums of health to achieve a universal health coverage for all [15]

CONCLUSION

Despite having poor consultation practices and seldom referring post CSD patients for physiotherapy, medical doctors who participated in the study exhibited adequate level of knowledge and positive attitudes, towards physiotherapy management and strongly agreed that physiotherapy was beneficial to women after CSD. As such, the need for improvements in the role, effectiveness and influence of physiotherapists in their management strategy of post CSD patients must be emphasized. Embarking on awareness campaigns on the conditions that physiotherapists manage post-CSD among health personnel will not only strengthen their role within the multidisciplinary team but benefit women who require their services.

DECLARATION

Competing interests There were no competing interests from all authors in this study.

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