

Neonatal outcomes of birth asphyxia in tertiary care hospital of low-income country

Muhammad Asif Siddiqui¹, Sehrish Masood², Tayyaba Khawar Butt³, Shahla Tariq⁴

¹Neonatal Fellow / Assistant Professor, Paediatric Medicine Unit-II, Services Hospital, ²Senior Registrar, Paediatric Medicine Unit-II, Services Hospital, ³Professor, Neonatology Department, Paediatric Medicine Unit-II, Services Hospital, ⁴Senior Registrar, Paediatric Medicine Unit-II, Services Hospital, Lahore

Correspondence to: Dr Muhammad Asif Siddiqui, Email: drmasifmc@gmail.com

ABSTRACT

Background: Pakistan has highest neonatal mortality in the region and birth asphyxia is one of the main preventable contributors to this. Objective of this study is to determine the frequency of different neonatal outcomes in neonates with birth asphyxia.

Subjects & Methods: It was descriptive case series study conducted in Department of Pediatrics Medicine, Services Hospital, Lahore in 6 months period during 6th Dec 2016 to 5th June 2017. 150 cases were included using non probability, consecutive sampling with 95% confidence level, 6% margin of error taking an expected percentage of neonate mortality as 15%. Data was analyzed with SPSS version 23. Categorical variables i.e., gender and neonatal outcomes in terms of neonatal mortality, discharge and neurological complications were expressed by frequency and percentage. Post stratification chi square test was applied. A p-value of ≤ 0.05 was taken as significant.

Results: The mean age of neonates was 3.09 ± 0.8 hours. Outcomes of these neonates was seen in terms of mortality, discharge and neurological problems. Out of total 150 patients, 51 (34%) neonates expired and 99 (66%) neonates were survived. And neonates 69 (46%) neonates were diagnosed with neurological complications.

Conclusion: We found, birth asphyxia has significant association with neonatal mortality and neurological complications. Prevention of birth asphyxia with appropriate resuscitation at birth may be helpful in reduction of morbidity and mortality due to birth asphyxia.

Keywords:

Neonates, Birth Asphyxia, Mortality, Neurological complications, Low-income country

INTRODUCTION

Neonatal mortality and morbidity is very high in Pakistan and improvement has been marginal since 1990.¹ Neonatal mortality in Pakistan is 42 per 1000 live births, which is unfortunately the highest in the world.^{1,2} Main causes of neonatal deaths are infections, asphyxia, low birth weight and hypothermia.³ Birth asphyxia is main contributor in perinatal and neonatal mortality in developing countries.⁵ Apart from increasing in neonatal mortality, birth asphyxia is also responsible for short term and long term neurological complications. Birth asphyxia is a lack of gas exchange to or from the fetus before, during, or after the birth process. Birth asphyxia can result in serious systemic and neurologic complications due to decreased blood flow and/or oxygen to a fetus or infant during the peripartum period. When placental or pulmonary gas exchange is compromised, there is lack of oxygen to the vital organs. This result in damage to the tissues and

vital organs (muscle, liver, heart, and ultimately the brain).⁶ Many factors like anemia, pregnancy induced hypertension, maternal diabetes and placental abruption contributes to birth asphyxia.⁷ Usually treatment of birth asphyxia is supportive and symptomatic, though therapeutic hypothermia is helping in management but **due to huge cost and human resource related issues, it's not freely available in our local settings.**⁸ There are very few local studies on the frequency and neurological impact of birth asphyxia as compared with International studies.^{9,10}

Purpose of this study is to highlight the importance of birth asphyxia and its consequences as it is preventable cause of neonatal mortality and morbidity. Objective of this study was to determine the frequency of different neonatal outcomes in neonates diagnosed with birth asphyxia. Whereas, mortality and neurological complications were taken as neonatal outcomes.

SUBJECTS AND METHODS

It was descriptive case series study conducted in Department of Pediatrics Medicine, Services Hospital, Lahore in 6 months duration from 6th Dec 2016 to 5th June 2017 with approval from IRB. Mortality was

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defined as neonatal death during hospital stay. Discharge was defined as improvement of neonate from Hypoxic Ischemic Encephalopathy (HIE), having normal sucking feed and able to maintain body temperature ($>97^{\circ}\text{F}$ and $<99^{\circ}\text{F}$ for 12 hours).¹¹ Whereas, neurological complications as neurological abnormality during hospital stay: (any one or more) seizures assessed on clinical examination / history, change in tone, swallowing and sucking difficulty observed during feeding, reduced/ exaggerated neonatal reflexes observed at the time of discharge. Birth asphyxia was defined as if neonate has pH level less than 7.1 and APGAR score < 7 in 5-minute reading.^{11,12}

All neonates (both male and female) fulfilled operational definition of birth asphyxia were included. Whereas, all neonates with dysmorphism, comorbid conditions like sepsis, congenital anomalies and no Apgar score record were excluded.

150 neonates were included using non probability, consecutive sampling with 95% confidence level, 6% margin of error taking an expected percentage of neonate mortality as 15%. Data was collected through a well-defined proforma after written consent and entered into SPSS version 23. Categorical variables i.e., gender and neonatal outcomes in terms of neonatal mortality, discharge and neurological complications by frequency and percentage. Data was stratified for type of delivery, gestation and gender to control effect modifiers. Post stratification chi square test was applied. A p-value < 0.05 was taken significant.

RESULTS

Among study population, mean age of neonates was 3.09 ± 0.8 hours, in which 73 (48.7%) neonates were male and 77 (51.3%) were female neonates. Among 150 women 75 (50%) delivered through C-section and the remaining 75 (50%) delivered through SVD. The cases included 77 (51.3%) term and 73 (48.7%) preterm

infants 51 (34%) neonates died, 99 (66%) were survived and neurological complications was seen in 69 (46%) as shown in Table 1.

Mortality and neurological complications did not show significant correlation with gender. Type of delivery was significantly associated with mortality (p-value=0.025), survival (p-value=0.025) and neurological complications (p-value=0.033). Mortality and neurological complications did not show any statistically significant association towards gestational age (Table 2).

DISCUSSION

Pakistan has the highest neonatal mortality in world and birth asphyxia is one of the major contributory factor and preventable cause.¹⁻⁴ Perinatal asphyxia has significant impact on neonatal mortality, morbidity, neurological and intellectual development of the infant, despite advances in perinatal care.¹³

Among all of asphyxiated term infants, antenatal or intrapartum insult occurs in 90% cases, while post-partum insults account for 10% cases.¹⁴

Neonatal deaths are a major contributor to IMR in Pakistan. Asphyxia accounts for one of the main causes of neonatal mortality.¹⁵ In our study outcomes in asphyxiated babies were studied in terms of mortality and neurological complications. Mortality was seen in 51 (34%) neonates and 69 (46%) were diagnosed with neurological complications.

Mortality rate reported by different studies for neonates with asphyxia ranges between 5.6%-52.38%^{4,10,14,16-20} Mortality rate reported in this study lies in between the range reported by previous studies. Any decrease in asphyxia related events would significantly decrease the overall neonatal mortality. Recent advancements in neonatal care at delivery room and both invasive and non-invasive mechanical ventilations have revolutionized the outcome of asphyxiated newborns.

In our study survival of asphyxiated neonates did not show any statistically significant association with gender or gestational age. However, survival and probability of neurological complications was significantly associated with type of delivery.

Some studies showed significant association between survival and gender of female neonates.¹⁹ Others show significant association with gestational age.^{18,20} Likewise some showed significant correlation between mode of delivery and survival.²¹ Babies delivered via c-section had significant mortality and neurological complications in comparison with SVD

Table 1. Distribution of patients according to different variables/outcomes

Characteristics	n (%)
Gender	
Male	73 (48.7%)
Female	77 (51.3%)
Mode of delivery	
C-section	75 (50%)
SVD	75 (50%)
Gestational Age	
Term	77 (51.3%)
Preterm	73 (48.7%)
Outcome	
Mortality	51 (34%)
Survival (discharged)	99 (66%)
Neurological Complications	69 (46%)

Table 2: Comparison of outcomes (mortality, discharge, neurological complications) with gender, mode of delivery and gestation

Characteristics	Mortality (Total expired =51)	p-value	Survival (Total survived = 99)	p-value	Neurological complications	p-value
Male	26 (35.6%)	0.686	47 (64.4%)	0.686	36 (49.3%)	0.53
Female	25 (32.5%)		52 (67.5%)		33 (42.9%)	
C-section	32 (42.7%)	0.025	43 (57.3%)	0.025	28 (37.3%)	0.022
SVD	19 (25.3%)		56 (74.7%)		41 (54.7%)	
Term	26 (33.8%)	0.612	51 (66.2%)	0.612	38 (49.4%)	0.603
Preterm	25 (34.2%)		48 (65.8%)		31 (42.5%)	

babies in our study. Obstetric complications leading to c-section like obstructed labor, intrauterine fetal distress and meconium staining may explain this. We only looked for neurological complications during hospital stay but there is need to see long term complications in future studies in local settings.¹⁸ Surviving neonates with birth asphyxia had developmental delay in 30% of patients at 2 years of age.²² Whereas motor deficit in 22.5% survivors.²³ This emphasizes the need for careful neurodevelopmental evaluation and comprehensive care in surviving babies with birth asphyxia.²⁴

Birth asphyxia is one of the leading causes of admission of a newborn to neonatal intensive care unit and a leading cause of morbidity and mortality in neonates. It may be possible to reduce the occurrence of asphyxia and its complications by improving antenatal, intrapartum and neonatal care services in the community.

CONCLUSION

We found, birth asphyxia has significant association with neonatal mortality and neurological complications. Prevention of birth asphyxia with appropriate resuscitation at birth may be helpful in reduction of morbidity and mortality due to birth asphyxia.

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