

OUTCOME OF TERM NEWBORNS WITH HYPOXIC ISCHEMIC ENCEPHALOPATHY

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ABSTRACT

Background: Hypoxic ischemic encephalopathy is main complication of the birth asphyxia. The objective of the study was to determine the frequency of outcome of term newborns with hypoxic ischemic encephalopathy(HIE).

Material & Methods: This cross sectional study was done at Neonatology Unit of National Institute of Child Health, Karachi, from July, 2014 to January, 2015. Sample size was 162 cases selected through consecutive sampling technique. Mean age was 7.74 ± 3.87 days. Males were 100 (61.7%) and females were 62 (38.3%). All neonates of either gender from birth to 14 days of life presented with gestational age >37 weeks & <42 weeks and having history of initiate and sustain failure of breathing for \geq one minute after birth were enrolled. Patient was followed up till 14 days and final outcome was assessed in terms of mortality and improvement. The stages of hypoxic ischemic encephalopathy were assessed on the basis of Sarnat staging. Final outcome (improved / mortality) was assessed on 14th day of admission. All the data i.e. age of neonate in days, age groups, gestational age in weeks, gender, outcome (improved and mortality) HIE stages were entered in the pre designed proforma.

Results: There were 64 (39.50%) patients with HIE stage I, 62 (38.30%) with HIE stage II and 36 (22.2%) patients with HIE stage III. Improved outcome was observed in 137 (84.6%) while death was observed in 25 (15.40%) patients.

Conclusion: Severity of HIE (stage III) was found significantly associated with mortality.

KEY WORDS: Hypoxic Ischemic Encephalopathy; term newborn; Mortality.

This article may be cited as: Mahar S, Parkash J, Das C, Saeed M. Outcome of term newborns with hypoxic ischemic encephalopathy. Gomal J Med Sci 2017;15:42-5.

INTRODUCTION

Birth asphyxia and hypoxic ischemic encephalopathy (HIE) are among common problems in our country that needs admission.¹ Birth asphyxia has been defined as failure to establish breathing within one minute after cutting cord.² HIE is commonest complications of birth asphyxia described as the syndrome of distressed neurological function, depression of the tones and reflexes, respiration, presence of the consciousness and seizures.³ HIE is further classified by Sarnat in three stages of severity with predictable outcome.^{4,5} Sarnat stage I has excellent prognosis and stage III has worst, while stage II is less associated with morbidity and mortality.⁶ Accord-

ing to studies in developed countries in which HIE was classified as mild, moderate, or severe showed that 25% of moderate and 90-100% of severe cases suffered major neurodevelopmental sequelae. Studies in the United Kingdom and other developed countries have shown that the incidence of HIE is approximately 6 per 1000 live births and estimate up to 25% of perinatal death in the full term neonates. There are few reliable data about the epidemiology or natural history of neonatal HIE in high risk populations of less developed countries.⁷ According to WHO, prevalence of the birth asphyxia is about 3%. Estimate 4 million develop birth asphyxia, and from asphyxiated neonates about 1.2 million die.⁸ Peri-natal mortality in Pakistan is 95 per 1000 births. Local data, although limited, indicates that birth asphyxia is the commonest cause of admissions to the neonatal units.⁹ Previous published data from paediatric department Liaquat university Hyderabad, Pakistan, showed that neurological evaluation done within 24 hours of admission, 15% newborns were normal while clinical signs of HIE were present in 85% babies, out of which 30% babies were in stage I, 35% in Stage II and 20% in stage III.⁸ Birth asphyxia

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Date Submitted: 07-03-2017

Date Revised: 29-03-2017

Date Accepted: 30-03-2017

or HIE is a global issue especially in the developing countries like Pakistan. Mortality and morbidity due to HIE remains high despite the recent advances. Subsequently it is the preventable event and prolonged neurological sequelae are nearly untreatable once asphyxia occurred. The objective of the study was to determine the frequency of outcome of term newborns with hypoxic ischemic encephalopathy.

MATERIALS AND METHODS

This cross sectional study was done at Neonatology Unit of National Institute of Child Health, Karachi, from July, 2014 to January, 2015. Sample size was 162 cases selected through consecutive sampling technique. All neonates from birth to 14 days of life having history of failure to initiate and sustain breathing for \geq one minute after birth, either gender and with gestational age >37 weeks & <42 weeks were included. All the neonates with congenital anomalies, with Down syndrome, neonates with congenital viral infection, severe hyperbilirubinemia and neonates with inborn error of metabolism were excluded from the study. Patients were followed up till 14 days and final outcome was assessed in terms of mortality and improved as mentioned in operational definition. The stage of HIE was assessed on the basis of Sarnat staging. Final outcome that is improved and mortality was assessed on 14th day of admission. All the data i.e. age of neonate in days, age groups, gestational age in weeks, gender, outcome (improved and mortality) and HIE stages were entered in the pre designed proforma.

The data collected in the study was analyzed by using the SPSS version 17. Frequency and percentage was calculated for age groups, gender, stages of HIE and mortality. Chi Square test was applied to compare the outcome variables, and p-value less than 0.05 was considered as significant.

RESULTS

Mean age of the patients was 7.74 ± 3.87 days. Majority of the patients 90 (55.60%) were presented with >7 days of age. Male preponderance was found as 100 (61.7%) as compared to females 62 (38.3%). Majority of the patients 138 (85.20%) were presented with ≤ 40 weeks of gestational age. Table 1.

There were 64 (39.50%) patients with HIE stage I, 62 (38.30%) with HIE stage II and 36 (22.2%) patients with HIE stage III. Figure 1

Improved outcome was observed in 137 (84.6%) while death was observed in 25 (15.40%) patients. Figure 2

No significant differences were found in the outcome according to age, gestational, age and gender, p-value 0.66, 0.78 and 0.79 respectively. Table 2

A significant difference was found in the outcome according to the severity of HIE, as well as

majority of patient 16 out of 25 died with HIE stage III. Table 3

Table 1: Demographic characteristics of term new borns with hypoxic ischemic encephalopathy (n=162)

Basic characteristics	Frequency	Percentage
Neonatal age		
<7 days	72	44.40%
>7days	90	55.60%
Gestational age		
<40 weeks	138	85.20%
>40 weeks	24	14.80%
Gender		
Male	100	61.70%
Female	62	38.30%

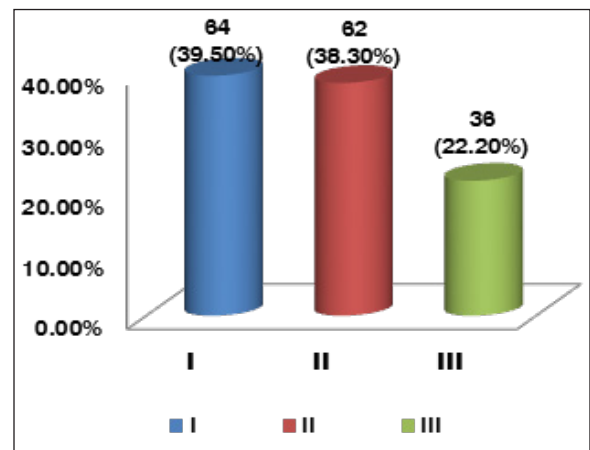


Figure 1: Stage of HIE n=162

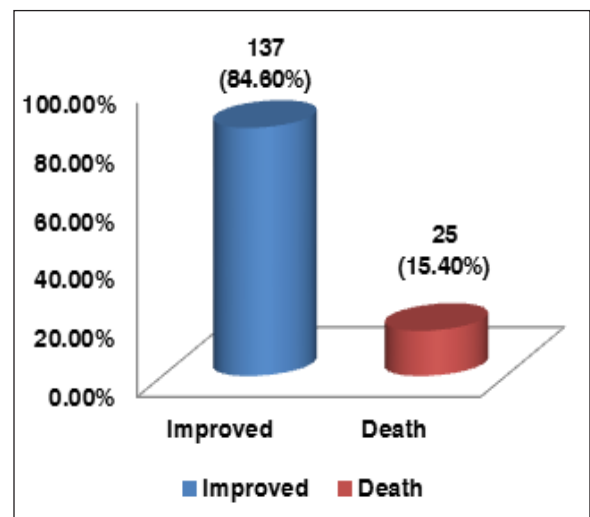


Figure 2: Outcome of the cases n=162

Table 2; Comparison of outcome according to age, gestational age and gender (n=162).

Age (in days)	Outcome		Total	p-value
	Improved	Death		
Age				
≤7	62(45.3)	10(40)	72(44.4)	0.668
>7	75(54.7)	15(60)	90(55.6)	
Total	137(100%)	25(100%)	162(100%)	
Gestational age				
≤40	117(85.4)	21(84)	138(85.2)	0.786
>40	20 (14.6)	4(16)	24(14.8)	
Total	137(100%)	25(100%)	162(100%)	
Gender				
Male	84(61.3)	16(64)	100(61.7%)	0.799
Female	53(38.7)	9(36)	62(38.3%)	
Total	137(100%)	25(100%)	162(100%)	

Table 3: Comparison of outcome with HIE stage (n=162).

HIE Stage	Outcome		Total	p-value
	Improved	Death		
I	61 (44.5)	3 (12)	64 (39.5)	0.001
II	56 (40.9)	6 (24)	62 (38.3)	
III	20 (14.6)	16 (64)	36 (22.2)	
Total	137 (100%)	25 (100%)	162 (100%)	

DISCUSSION

Perinatal asphyxia is the major and serious cause of morbidity and mortality in neonates globally.¹⁰ WHO reported in 2000 that out of 130 million neonates born globally per year, estimate 4 million neonates die under one month of the age, and it has been shown that 99% of these deaths of neonates occur in developing nations, perinatal asphyxia contributes to almost 23% of these deaths.¹⁰ Padayachee N et al¹¹ reported that out of 450 infants 41.1% were females and mean of the gestational age was 39.1 ± 2.2 weeks, these finding are comparable with our results as male were in higher number i.e. 100 (61.7%) than females 62 (38.3%).

In our study, majority of the cases 64 (39.50%) were found with HIE stage I, followed by 62 (38.30%) with HIE stage II and 36 (22.2%) patients with HIE stage III. Similarly Thakkar PA et al¹² demonstrated that out of 45 babies, 35 developed HIE, of which 13 (28.8%) were in HIE stage II and 13 (28.8%) were in HIE stage III. Memon S et al⁸ showed that 15% newborns were normal while clinical signs of HIE were in 85% neonates, out of them 30% were in stage I,

35% neonates in Stage II and 20% neonates were in stage III of HIE.

In this study improved outcome was observed in 137 (84.6%) while mortality was observed in 25 (15.40%) patients. Similarly mortality in other studies range from 10% to 45%.¹³⁻¹⁵ Thakkar PA et al¹² reported 20% mortality. The varying rates of mortality may be due to type of patients based on high risk pregnancy, late referral in case of obstructed labour, type and level of Neonatal ICU care. Studies of developing nations demonstrated that 18% of survivors with mild to moderate birth asphyxia had newborn encephalopathy and long lasting severe neurological impairment.^{16,17}

In our findings, a significant difference was found in the outcome according to the severity of HIE, as majority of patients 16 out of 25 died with HIE stage III. Similarly other studies also reported that mortality rate was high in HIE stage III.¹³⁻¹⁵ We found no significant difference in mortality in the different age groups, gestational age groups and gender, p-value 0.66, 0.78 and 0.79 respectively. A Nigerian study also reported comparable findings.¹⁰

CONCLUSION

Severity of HIE (stage III) was found significantly associated with mortality.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

None declared.

AUTHORS' CONTRIBUTION

Conception and Design:	SM, JP
Data collection, analysis & interpretation:	SM, JP, CD, MS
Manuscript writing:	SM, JP