

To Study the Incidence of Renal Failure in Birth Asphyxia and to Correlate the Severity and Type of Renal Failure using AKIN Criteria and Levine's Staging of HIE

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Abstract: *Background:* special neonatal care unit is a tertiary care centre where neonates with birth asphyxia are admitted. As kidneys are very sensitive to oxygen deprivation, because renal Insufficiency may occur within 24 hours of a hypoxic ischemic episode, which if prolonged may even lead to irreversible cortical necrosis.⁽⁶⁾ Early recognition of renal failure is important in a babies with birth asphyxia to facilitate appropriate fluid and electrolyte management to decrease the incidence of acute kidney injury. *Method:* Analysis of serial serum creatinine levels up to 96 hours of life and urine output of 24 hour of life in a term inborn birth asphyxiated babies were admitted in SNCU of M.G.M Medical college Indore from June 2017 to June 2018. Statistics analysis was done using Chi-square test, annova test. *Results:* A total of 50 term Birth Asphyxiated inborn babies were included in the study. In our study, Overall incidence of AKI was 56%. The incidence of AKI in mild BA was 25%, 50% in moderate BA and 100% in severe BA. Urine output was less in severe birth asphyxia comparison to mild and moderate birth asphyxia but oliguria was not found in all grades of HIE. *Conclusions:* All asphyxiated babies with Apgar score <6 at 5 minutes may be associated with renal failure.

Keywords: Birth asphyxia, Hypoxic ischemic encephalopathy

1. Introduction

Birth asphyxia is a common problem and contributes significantly to neonatal morbidity and mortality.⁽¹⁾ It ranks as the third most important cause of neonatal death after infections(36%), Preterm(28%) accounting for about 24% mortality worldwide.⁽²⁾

Birth asphyxia is an insult to the fetus or the newborn due to lack of oxygen (hypoxia) and/or a lack of perfusion (ischemia) to various organs.⁽³⁾

National neonatology forum of India has suggested that Birth Asphyxia should be diagnosed when "baby has gasping and inadequate breathing or no breathing at 1 minute".⁽⁴⁾(NNF of India)

Birth asphyxia is an eventuality having far reaching consequences in the neonatal period. Overall incidence of asphyxia is reported to vary from 1 to 1.5% at various centres and is related to birth weight and gestational age of the baby.⁽⁵⁾

Hypoxia and ischemia can cause damage to almost every tissue and organ of the body and various target organs involved have been reported to be **kidneys in 50%** followed by CNS in 28%, CVS in 25% and lungs in 23% cases.⁽⁶⁾

As kidneys are very sensitive to oxygen deprivation, renal Insufficiency may occur within 24 hours of a hypoxic ischemic episode, which if prolonged may even lead to irreversible cortical necrosis.⁽⁶⁾ Diagnosis of renal failure is

difficult in neonates as many of the established clinical and biochemical parameters are unreliable in this age group.⁽⁶⁾

2. Objective

To study the incidence of renal failure in birth asphyxia and to correlate the severity and type of renal failure by using AKIN criteria and LEVINE's staging of HIE.

3. Material and Methods

A prospective case study of 50 newborn babies, delivered in MYH was carried out in neonatal unit of paediatrics, M.G.M Medical College and MYH Indore.

The study was conducted over a period of 1 year from JUNE 2017 to June, 2018. During the study period 50 term, inborn asphyxiated neonates were selected as cases.

ON the basis of Apgar score at 5 minutes the asphyxiated babies were further grouped into mild (score 6), moderate (score 5 or 4), severe (3 or 4) according to LEVINE's staging was also used to assess the severity of asphyxia.

Renal parameter including serum creatinine was daily measured until 96 hours of life along with urine output monitoring for first 24 hours of life.

First serum creatinine at birth was taken as a baseline. staging of AKI was undertaken using Acute kidney injury network criteria (AKIN). (7)

Selection of Cases

Volume 8 Issue 3, March 2019

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Inclusion Criteria: The diagnosis of asphyxia will be considered if any two of the following criteria are met:

- 1) Need for neonatal resuscitation for more than one minute.
- 2) APGAR score < 6 at five minute

Exclusion Criteria

- 1) Newborn with congenital malformation.(CNS/RENAL)-diagnosed antenatal ultrasound
- 2) Prematurity

On the basis of APGAR score at 5 minutes the asphyxiated babies will be further grouped into –

- Mild (score of 6)
- Moderate (score 5 or 4)
- Severe Asphyxia (score 3 or less)

A detailed data of the babies including sex, name, address, date of admission, contact number, mode of delivery, maternal risk factor, resuscitation steps, gestational age, weight, length and head circumference of babies and clinical systemic examinations. serial serum creatinine level were

measured up to 96 hours of life and urine output were measured for 24 hours of life by applying plastic bags. The data were entered into Microsoft excel spreadsheet and analyzed.

4. Observation and Result

In the present study babies were monitored clinically and effect of birth asphyxia on renal was seen by serum creatinine serial levels and urine output. It was found that serum creatinine was increased in severe and moderate birth asphyxia compared to mild birth asphyxia.

Mean and standard deviation of Serum creatinine at birth, 48 hours and 96 hours of life were measured by applying **one way annova test.**

Annova test were also applied between and within groups of birth asphyxia for observing significant p value of serum creatinine **at birth** it was **.320**, at **48 hours of life** was **0.006** and at **96 hours** of life it was **0.004** which was statistically significant.

At birth

	Mild (4)	Moderate (38)	Severe (8)	Total (50)
Mean	.690000	.583947	.656250	.604000
Std deviation	.1893850	.1737276	.130179	.1696094
Annova test	Sum of square	Mean square	F	Significant
Between group	1.0677	.33	1.167	0.320
Within group	1.343	.29		
48 hours of life	Mild (4)	Moderate (38)	Severe (8)	Total (50)
Mean	1.025000	.999737	1.601250	1.098000
Std deviation	.3116087	.4376379	.6142461	.5037249
	Sum of square	Mean square	F	Significant
Between group	2.414	1.207	5.663	0.006
Within group	10.019	.213		
Total	12.433			

	Mild (4)	Moderate (38)	Severe (8)	Total (50)
96 hours of life				
Mean	.735000	.780263	1.308750	0.861200
Std deviation	.2148643	.3817562	.4993835	.4331076
	Sum of square	Mean square	F	Significance
Between group	1.915	.958	6.135	0.004
Within group	7.276	.155		
Total	9.192			

Classification according to Akin Criteria and Levine’s Staging

Levine’s Staging of HI HIE	No. of Patient Developed AKI Stages			Total	%
	Stage-1	Stage-2	Stage-3		
Mild (n=4)	01	0	0	4	25%
Moderate(n=38)	10	07	02	38	50%
Severe (n=8)	02	05	01	8	100%
Total	13	12	03	50	

Incidence of AKI

In the present study, of the 50 asphyxiated babies, 25% mild BA developed AKI stage-1, 52% moderate BA developed stage -1 AKI, 36% stage-2 AKI and 10% stage-3 AKI, 25% severe BA developed stage-1 and 62% stage-2 AKI and

12.5% developed stage-3 AKI. It indicates that Severity of birth asphyxia directly correlate with renal insufficiency.

Comparison of Urine Output in Cases with AKI and without AKI

Urine output 24 hour (ml/kg/hr)	Cases with AKI staging			Cases without AKI	Total
	Stage 1	2	3		
0.5	0	0	0	0	0
0.7-1	01	02	02	0	05
1.2	08	08	02	08	26
1.3-1.4	03	02	0	08	13
1.5-1.8	01	0	0	05	06

Of the 50 asphyxiated neonates, **Urine output** was low, more in stage -2 and stage 3- AKI Patient (<1ml/kg/hr) comparison to stage 1 AKI. Urine output between 1-1.4 ml/kg/hr (normal) 24% in stage-1, 20% in stage -2 and 2% in stage-3, 32% in cases without AKI. Urine output between 1.5-1.8 ml/kg/hr more in (10%) cases without AKI and (2%) in stage-1. Urine output was less in patient with stage 2 and 3 AKI but Oliguria was not found in a patient with any staging of AKI.

5. Discussion

The main objective of the study was to assess the value of serial serum creatinine as a marker of renal failure in birth asphyxia and to correlate the severity and type of renal failure using AKIN criteria with Levine's staging of HIE.

Of late new biochemical parameters are being evaluated with the hope of using them for the definition and diagnosis of perinatal asphyxia. Estimation of serum creatinine requires simple kits and is cost effective.

Overall incidence of AKI was 56%. Overall incidence of AKI in mild BA was 25%, 50% in moderate BA and 100% in severe BA. (Chi square test were applied, it was <0.005 which was significant statistically) .

Urine output was less in severe birth asphyxia comparison to mild and moderate birth asphyxia but oliguria was not found in all grades of HIE. (AKIN criteria).

6. Conclusion

Five minute Apgar scoring in present study with respect to mortality was found to be significant parameter for prognosis as compared to one minute Apgar score. Effective resuscitation leads to improvement in APGAR score. There was significant difference p value <0.005 between apgar score at 1 and 5 minute, these indicates appropriate resuscitative measures (Bag & mask, ET, Drugs) should be carried as early as possible to improved apgar scores and prevent hypoxic damage.

In, conclusion, all babies with birth asphyxia should be attended by a trained pediatrician and appropriate resuscitation should be carried out as early as possible to prevent hypoxic damage. All asphyxiated babies with Apgar score <6 at 5 minutes may be associated with renal failure.

References

- [1] Erdag GC, Vitrinel A, "Can urinary uric acid/ creatinine ratio be used as an additional marker for neonatal asphyxia." International Pediatrics 2004; vol 19(4): 217-219.
- [2] WHO neonatal perinatal mortality 2018

- [3] Aurora S, Snyder EY, Perinatal asphyxia. In: John P Cloherty et al, Manual of neonatal care, Lippincott Williams and Wilkins, 5th ed. 2004, Chap 27: 536-555.
- [4] Report of the national perinatal database (NNF, India) 2000.
- [5] Anne R, Ann R. perinatal asphyxiainclohertyjp stark manual of neonatal care 8th edition, chapter 55
- [6] Perlman JM, TackED, Martin T. acute systemic organ injury at term infants after asphyxia.
- [7] Mehta at al 2007. Acute kidney Injury Network.