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ASPHYXIA NEONATORUM;

RENAL DERANGEMENT IN NEONATES WITH ASPHYXIA NEONATORUM.

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ABSTRACT… Introduction: Severe hypoxic ischemic organ damage is caused by asphyxia in newborns which can follow fatal outcomes or severe life-long pathologies like renal insufficiency. We wanted to note the frequency of renal derangement in neonates having asphyxia neonatoum in this study. **Setting & Period:** Department of Pediatrics, Bahawal Victoria Hospital (BVH), Bahawalpur, from 1st January 2017 to 31st June 2017. **Materials & Methods:** Two hundred and sixty four neonates of both genders with birth asphyxia were included in the study. Main outcome was renal derangement in asphyxia neonatorum. **Results:** Mean weight was 2.54 kg with standard deviation 0.50 kg and having mean APGAR score 4.43 with SD 1.66. 0lt was noted that 189 (71.6%) neonates had Renal derangement in which 109 (57.7%) were males and 80 (42.3%) were females with mean of weight was 2.53kg, having mean APGAR score 4.44. **Conclusion:** Renal derangement is quite common in neonates with birth asphyxia.

Key words: Asphyxia Neonatorum, Apgar score, Low Birth Weight, Renal Derangement.

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INTRODUCTION

Perinatal asphyxia is a significant factor contributing to neonatal morbidity and mortality around the world.[1] Global incidence of Perinatal asphyxia is 1.0-1.5%.[2] WHO reports that ~1 million children die worldwide annually with birth asphyxia. Distinguish between mild and severe asphyxia is a difficult task. Improving diagnosis and early prediction of asphyxiated neonates has been in focus for researchers in the recent years.[3]

Asphyxia damages the CNS, leading to CNS related complications. Asphyxia is caused by oxidative stress, raised cerebral permeability, birth trauma and metabolic complications.[4] Measuring oxidative stress markers can predict outcomes in newborns with asphyxia.[5] Acute kidney injury is associated with perinatal asphyxia, responsible for about 50% of cases.[6] The pathology of specific biomarkers has attracted interest of many researchers and has proved to be of huge clinical worth in the recent years.[7] Renal insufficiency is more frequent within 24 hours of a hypoxic ischemic episode.[8] Early detection of renal failure aid to appropriate fluid and electrolyte management. Diagnosing renal failure is challenging as some of the established clinical and biochemical parameters are untrustworthy.[9] In newly born, S100B has been found to be significantly increased in blood serum when noted after 24 hours of severe birth asphyx insult.[10,11]

Gupta BD conducted a study on neonates having asphyxia and renal failure, found that 78% of axphyxiated neonates had nonoliguric renal failure[12] while oliguric failure was seen in 21%. We conducted this study to note the frequency of renal derangement in neonates with asphyxia neonatoum.

MATERIAL AND METHODS

This was a descriptive study conducted in department of pediatrics, Bahawal Victoria Hospital (BVH), Bahawalpur, from 1st January 2017 to 31st June 2017. A total of 264 term neonates of both gender, having asphyxia, delivered in gynecology department of BVH, Bahawalpur, were included in this study with non probability consecutive sampling technique. Newborns with renal insufficiency or oligohydrominas seen by antenatal ultrasound, or having history of maternal addiction of analgesia and severe infection were excluded from the study.

Ethical committee of BVH approved the study. Informed consent was taken from the guardians/ parents of the newborns and confidentiality of the data and identity was ensured. Blood sample for serum creatinine were taken at 72 hours of life. Risks/benefits of this study and protocols were discussed with parents/guardians. Weight of the newborns was noted at the time of birth.

Mean and standard deviation were noted for quantitative variables like APGAR score and birth weight. Frequency and percentages were calculated for qualitative variables like gender and renal derangement. Stratification was done to control the effect modifier like birth weight, APGAR score and gender. Chi square test was applied and a p value ≤ 0.05 was considered statistically significant.

RESULTS

Total neonates included in this study were 264 (100%) having mean of weight was 2.54 kg with standard deviation was 0.50 and having mean of APGAR score was 4.43 with SD 1.66. Out of 264 neonates it was observed that 147(55.7%) were males with mean weight was 2.59 kg and standard deviation was 0.493 And 117(44.3%) were females with mean weight was 2.47 kg and standard deviation was 0.501.

Out of 264 neonates, it was noted that 189 (71.6%) neonates suffered from Renal derangement in which 109 (57.7%) were males and 80 (42.3%) were females with mean of weight was 2.53kg and standard deviation was 0.5 and having mean of APGAR score was 4.44 with standard deviation was 1.667. It was also observed that 75 (28.4%) neonates were not suffered from Renal derangement in which 38 (50.7%) were males and 37 (49.3%) were females with mean of weight 2.56 kg and standard deviation was 0.5 and having mean of APGAR score was 4.40 with standard deviation was 1.652.

When stratified analysis was done to see the effect modification it was noted that there was no significant effect of renal derangement on birth weight (≤2.5 kg and >2.5 kg) and gender having p values 0.650 and 0.301 respectively. But significant association of APGAR score with renal derangement was seen with p value 0.0001.

Gender	Frequency	Percentage (%)
Male	147	55.7
Female	117	44.3
Total	264	100.0

Table-I. Distribution of gender

Renal Derangement	Frequency	%
Yes	189	71.6
No	75	28.4
Total	160	100.0

Table-II. Distribution of renal derangement

Characteristics	Mean	SD
Birth weight	2.54	0.50
Apgar Score	4.43	1.660

Table-III. Mean birth weight and apgar score

Renal Derangement	Gender		Total
	Male	Female	
Yes	109	80	189
No	38	37	75
Total	147	117	264
p-value = 0.301			

Table-IV. Renal derangement and gender

Renal Derangement	Birth weight		Total
	2kg	3kg	
Yes	89	100	189
No	33	42	75
Total	122	142	264
p-value = 0.650			

Table-V. Renal derangement and Birth weight

Renal Derangement	Apgar Score		Total
	1-4	5-7	
Yes	110	79	189
No	14	61	75
Total	124	140	264
p-value = 0.0001			

Table-VI. Renal derangement and Apgar score

Renal Derangement	Gender	Frequency	Percent
Yes	Male	109	57.7
	Female	80	42.3
	Total	189	100.0
No	Male	38	50.7
	Female	37	49.3
	Total	75	100.0

Table-VII. Renal derangement and gender

DISCUSSION

Adaptive mechanism is responsible for renal injury in asphyxiated newborns. Acute tubular necrosis, renal vein thrombosis and renal failure occur commonly and the prognosis is poor that has been documented to cause irreversible renal damage in ~40% of the survivors.[8] Urinary output is slightly less in neonates with severe birth asphyxia but with statistical insignificance in comparison to mild and moderate degree of asphyxia. Oliguria has been accounted in higher numbers from 25-69%.[9,10] Mixed response of individual nephron and variable damage to tubular epithelium may end up causing anatomical damage, then further leading to reduction in single nephron GFR, so, declining tubular fluid flow.[11]

About 10% of neonates develop hematuria and end up presenting with urinary red cell count up to 10 cells/mL.[12] Abnormal tubular function post asphyxia may lead lead to significant tubular proteinuria. Qualitative assessment of proteinuria has been proposed by measuring p2-M-a low molecular weight protein to detect tubular injury.[13,14] The mechanism of increased levels of urea and creatinin have been hypothesized as a result of obstructed tubular lumen and back leak mechanism. [15]

The incidence of renal involvement observed in the current study was 47% that is consistent with earlier findings.[15-17] Sonographic abnormalities were seen along with biochemical verification of renal dysfunction and three neonates were oliguric. Out of a total of 5 neonates with abnormal sonography, 4 died. None of the neonate was oliguric by 4th to 6th day of life which. This finding was pretty comparable to what Pertman, et al found.[8] Decrease in number of functional nephrons causing acute kidney injury, brings compensatory hypertrophy of the residual nephrons.[18] Oliguria, abnormal renal sonographic scan and hyponatermia were revealed as the most important signs predicting mortality in our study.

CONCLUSION

Renal derangement is quite frequent in asphyxiated neonates mostly with nonoliguric failure. Extent of renal dysfunction is directly related to degree of asphyxia.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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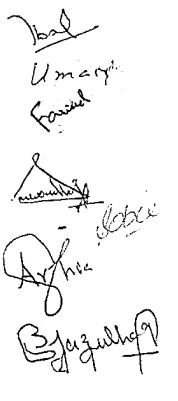
1	Iqbal Ahmed	Main concept and data collection for study.	
2	Umair Arshad	Data analysis.	
3	Fawwad Saleem	Data collection and compilation of results.	
4	Hafiz M. Anwar ul Haq	Paper drafting and discussion.	
5	Sobia Tabassum	Methodology and drafting.	
6	Arshia Sabir	Introduction and background of topic.	
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