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Research Article

TO STUDY LABORATORY FINDINGS (CK-MBAND LDH) IN ASSESSING THE SEVERITY OF PERINATAL ASPHYXIA AT M.G.HOSPITAL BHILWARA, RAJASTHAN

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A R T I C L E I N F O

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A B S T R A C T

Introduction: Perinatal asphyxia contributes significantly to neonatal morbidity and mortality.
Materials and Methods: A Hospital based prospective study conducted in M.G.Hospital Bhilwara. 100 babies were included in the study with perinatal asphyxia. The clinical and neurological examination was done for all the neonates included in the study. Blood samples for different systemic biomarkers were taken from all the babies.
Results: The correlation of cut-off CK- MB level of 92.6 U/L with the severity of HIE is significant (P=0.0001). The correlation of cut-off LDH level of 580U/L with the severity of HIE is significant (P=0.0001).
Conclusion: HIE is the most severe manifestation of perinatal asphyxia which can be predicted by early laboratory evaluation of biomarkers so as that early treatment can be initiated.

INTRODUCTION

Perinatal asphyxia is a condition wherein there is an impairment of transfer of the respiratory gasses resulting in hypoxemia and hypercapnia, accompanied by metabolic acidosis. The WHO defi nes perinatal asphyxia as "Failure to initiate or sustain breathing at birth." Perinatal asphyxia is a third most common cause of neonatal death (23%) after preterm birth (28%) and sepsis (26%). The asphyxial injury may involve virtually every organ system of the body, but hypoxic-ischemic encephalopathy (HIE) is the most common sequelae.[1]

HIE characterized mainly by abnormal muscle tone and refl exes, an altered level of consciousness, and commonly by convulsions is an outcome of perinatal asphyxia.[2] HIE is a cause of death in newborns, and who survive are prone to serious neurological disorders such as cerebral palsy.[2]

MATERIALS AND METHODS

Study design: Hospital based prospective study.
Study duration: 12 months
Sample size: 50 Cases comprised of asphyxiated and non-asphyxiated neonates, respectively.

The case group: It included 50 neonates fulfill the inclusive criteria

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Inclusion Criteria

1. Gestational age ≥ 37 weeks.
2. Appropriate for gestational age.
3. The neonates will be identified to have experienced perinatal asphyxia when at least 3 of the following are present:

   a. Intrapartum signs of fetal distress, as indicated by non reassuring NST on continuous electronic fetal monitoring and/ or by thick meconium staining of the amniotic fluid.
   b. Apgar score of <7 at one minute of life.
   c. Resuscitation with >1 minute of positive pressure ventilation before stable spontaneous respiration.
   d. Profound metabolic or mixed acidemia (pH<7.00) in an umbilical artery blood sample, if obtained.
   e. Mild, moderate or severe hypoxic ischemic encephalopathy (HIE), as defined by sarnat and sarnat 1976.

Exclusion Criteria

1. Congenital malformations.
2. Maternal drug addiction.
3. Neonates born to mothers who would have received magnesium sulphate within 4 hours prior to delivery or opiods (pharmacological depression).
4. Hemolytic disease of the newborn.
5. Neonates born to mothers consuming alcohol
6. Neonates born to mothers who are smokers

7. Neonates born to mothers on anti epileptics

The control group:It will include term apparently healthy neonates appropriate for gestational age without signs of peinatal asphyxia as evidenced by normal fetal heart rate patterns, clear liquor and one minute Apgar score >7.

Method of data collection

All neonates included in the study had the following done

- Detailed maternal history, assessment of intrau-terine fetal well being by continuous electronic fetal monitoring, meconium staining of amniotic fluid, birth events, Apgar score, sex of the baby and weight of the baby were recorded. Gestational age was assessed by New Ballard scoring system. Arterial blood gas analysis (ABG) was done if umbilical arterial blood was obtained.
- Thorough clinical and neurological examination was done for all the neonates included in the study.
- Blood samples were collected from the neonates and sent for:

A-Creatine Kinase Muscle-Brain fraction (CK-MB) levels.
B-blood sugar.
C-Lactate Dehydrogenase (LDH) levels.

Blood for CK-MB was drawn at 8±2 hours [3]. Blood for LDH was drawn at 72±2 hours of age. The upper limit of the normal range of CK-MB at 5-8 hours of life is 7.9% of 1,175 U/L which is -92.6 U/L taken as the cut-off level [4].

The normal reference value of LDH in neonates and infants <1 year is 170-580 U/L [4]. A value >580 U/L at 72 hours was taken as the cut-off level.

Sample collection

Blood was collected each time from the periph-eral venous site at 8±2 hours for CK-MB and 72±2 hours of age for LDH respec-tively under aseptic precautions. Serum CK-MB was analyzed by immunoassay on lmL clotted blood. Serum LDH was analyzed by the liq-uiUV test on lmL clotted blood.

Data analysis

Data will be recorded on a Performa. The data analysis will be computer based; SPSS-22 will be used for analysis. For categoric variables chi-square test will be used. For continuous variables independent samples's *t*-test will be used. *p*-value <0.05 will be considered as significanit.

RESULTS

The blood samples from 50 neonates constituted the material for the study. Among the 50 neonates in, there were 33 (66%) males and 17 (34%) females. Among the 50 neonates, 33 (66%) neonates weighed between2.5-3.0 kg, 15 (30%) weighed between 3.0-3.5 kg and 2 (4%) weighed > 3.5 kg. The mean weight was 2.97±0.29 kg. Among the 50 neonates, 26 (52%) were born to primi mothers and 24 (48%) were born to multi gravida mothers.

Table 1 Distribution of HIE as per Sarnat and Sarnat in cases.

HIE	Number of neonates (n=50)	%
I	22	44
II	11	22
III	17	34

Among the 50 neonates in the case group, 22 (44%) had HIE I, 11 (22%) had HIE II and 17 (34%) had HIE III during the course in NICU.

Table 2 Correlation of CK-MB and LDH with severity of HIE.

Variables	HIE			P value
	I	II	III	
CK-MB(U/L)				
<92.6	20(90.90%)	6(54.45%)	5(29.41%)	0.0001
>92.6	2(9.09%)	5(45.45%)	12(70.59%)	
LDH(U/L)				
<580.0	18(81.81%)	3(27.27%)	1(5.88%)	0.0001
>580	4(18.18%)	8(72.72%)	16(94.12%)	
Total	22(100.0%)	11(100.0%)	17(100.0%)	

Among the 50 neonates in the case group, 31 (62%) had CK-MB levels <92.6 U/L and 19 (32%) had CK-MB levels >92.6 U/L. Out of the 50 neonates, 50 (100%) developed HIE. 20 case of HIE I, 6 cases of HIE II and 5 case of HIE III had CK-MB levels <92.6 U/L. 2 cases of HIE I, 5 cases of HIE II and 12 cases with HIE III had CK-MB levels >92.6 U/L. The correlation of cut-off CK- MB level of 92.6 U/L with the severity of HIE is significant (P=0.0001).

Out of the 50 neonates, 22 (44%) had LDH levels<580 U/L and 28 (56%) had LDH levels >580 U/L. 50(100%) cases developed HIE. 18 case of HIE I, 3 cases of HIE II and 1case of HIE III had LDH levels <580 U/L. 4 cases of HIE I, 8 cases of HIE II and 16 cases with HIE III had LDH levels >580 U/L. The correlation of cut-off LDH level of 580U/L with the severity of HIE is significant (P=0.0001).

DISCUSSION

Perinatal asphyxia causes multiorgan dysfunction mainly the nervous system leading to encephalopathy, which may take 72 h for neurological manifestations to appear. As it requires nearly 3 days for the systemic manifestations and categorization into different stages, early laboratory analysis will be helpful so that initiation of the treatment is started, as treatment is effective only when it is administered in the fi rst 6 h of life.

In study done by Fernandez *et al*. measured the serum CKBB (brain isoenzyme) activities of 33 full-term newborns in the 4th and 10th h of life and discovered that babies who died of severe HIE or developed neurologic sequelae had signifi cantly higher serum CK-BB activities than babies who did not have neurological abnormalities. Based on this observation, they claimed that a high serum CK-BB activity is a sensitive marker of brain injury. In our study, the babies with HIE Stage 3 had higher CK-BB levels compared to that of the children in Stage 1 and 2.[5]

In our study, the levels of serum lactate and LDH levels are high in Stage 3 of HIE and, as the stage of HIE progressed, the results of the two tests used in measuring serum lactate and LDH levels showed a statistically signifi cant increase and same result was observed by Basu *et al*[6] .

Based on the results of our study, we can claim that the CK-BB and LDH level which were done at admission had higher prognostic factors in predicting the mortality before the clinical determination of the HIE stage in newborns with perinatal asphyxia according to the Sarnat and Sarnat scoring system. Further, determining the cutoff values for these biochemical markers would help clinicians to differentiate

Stage 1 HIE from the advanced stages so that therapeutic hypothermia treatment can be initiated

CONCLUSION

HIE is the most severe manifestation of perinatal asphyxia which can be predicted by early laboratory evaluation of biomarkers so as that early treatment can be initiated.

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