ORIGINAL ARTICLE

STUDY OF HEPATIC FUNCTION IN NEONATAL ASPHYXIA

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ABSTRACT: BACKGROUND/AIMS: Birth asphyxia occurs when a baby does not receive enough oxygen before, during or after birth ·It is an insult to the fetus or newborn due to lack of oxygen (hypoxia) and /or a lack of perfusion (ischemia) to various organs· Fetus totally depends for its oxygen supply and other nutrients on the blood supplied through placenta. In any case, if blood supplied through placenta is hampered, it leads to asphyxial injury. We performed this study to determine the incidence of liver failure in birth asphyxia and to correlate the severity of hepatic disorder with asphyxia by estimating serum AST and ALT**. MATERIAL AND METHODS:** The study included 70 asphyxiated neonates and 50 healthy neonates as controls. Serum AST and ALT were estimated by IFCC method for Aspartate aminotransferase and IFCC method for Alanine aminotransferase respectively. **RESULT:** Serum AST and ALT were found significantly higher in asphyxiated babies compared to control groups ($p<0.001$). The mean AST and ALT of asphyxiated babies were 80.3±47.4 U/L and 88.8±43.5 U/L, respectively and those of normal babies were 20.5±8.5 U/L and 27.5±8.5 U/L respectively. The rise of AST and ALT also showed a significant positive correlation with the severity of asphyxia. Hence it can be concluded from present study that estimation of hepatic enzymes can be used as markers to diagnose the incidence of perinatal asphyxia and also to assess its severity.

KEY WORDS: Birth asphyxia, Alanine aminotransferase (ALT), aspartate aminotransferase (AST), neonates.

INTRODUCTION: Birth asphyxia occurs when a baby does not receive enough oxygen before, during or after birth. It is an insult to the fetus or new born due to lack of oxygen and or lack of perfusion to various organs.[1] Fetus totally depends for its oxygen supply and other nutrients on the blood supplied through placenta. In any case, if blood supplied through placenta is hampered, it leads to asphyxial injury. According to WHO between four and nine million newborns develop birth asphyxia each year. Of those, an estimated 1.2 million die and at least the same number develop severe consequences, such as epilepsy, cerebral palsy, and developmental delay [2]. Target organs of perinatal asphyxia are the brain, heart, lungs, kidneys, gut and bone marrow. The most frequent abnormalities involving kidneys (50%) followed by CNS (28%), cardiovascular (25%) and pulmonary system (23%)[3].Thus there is evidence of multiorgan system dysfunction in the immediate neonatal period.[4]. The outcome of asphyxiated babies depend on severity of hypoxemia which adversely affects the liver, kidney, heart, brain and other organs (multi-system insult) [5, 6].The liver may be so damaged (Shock liver) that it may not provide its basic functions [7]. Hepatic dysfunction is caused by redistributing cardiac output away from non vital viscera to the heart, brain and adrenal glands [8]. We performed this study to determine the incidence of liver failure in Birth asphyxia and to correlate the severity of liver failure with asphyxia.

MATERIAL AND METHODS: The present study was carried out in department of Biochemistry, in active collaboration with Neonatal intensive care unit of department of pediatrics, S.A.I.M.S Medical College, Indore.

INCLUSION CRITERIA: 120 newborns admitted to department of pediatrics and its neonatal unit was enrolled for the present study. The enrolled babies were further divided into study group and control group.

Control group --- The control group had 50 healthy neonates who were free from any systemic disease.

Study group --- The study group comprised of 70 asphyxiated neonates.

EXCLUSION CRITERIA: Excluded from our cohort will be babies with necrotizing enterocolitis, severe septicemia and marked respiratory distress syndrome.

Clinical Examination: A detailed clinical examination was carried out as soon as the neonates were admitted. Gestational age [9], birth weight, relevant perinatal history; findings on physical examination were recorded on a pre-designed proforma.

Laboratory Investigation: The blood collected was allowed to clot and then centrifuged to obtain serum for estimation of biochemical parameters.

The investigations included: Liver enzymes AST and ALT were estimated by IFCC method for Aspartate aminotransferase [10] and IFCC method for Alanine aminotransferase [11] respectively.

STATISTICAL ANALYSIS: Values have been expressed as Mean±SD.The data were compiled and analyzed using descriptive statistics using students't' test. $P<0.05$ was considered as significant.

RESULTS: The study group included 70 asphyxiated neonates .In the present study we found that out of 70 neonates, 6(9%) were mildly asphyxiated, 35 (50%) were moderately and 29 (41%) were severely asphyxiated. Of the 70 neonates 45 were males and 25 females. Average gestational age of the study group was 36.92 weeks and that of the control group was 37.25 weeks. Serum AST and ALT were significantly higher in asphyxiated babies compared to control groups ($p<0.001$). The mean AST and ALT of asphyxiated babies were 80.3±47.4 U/L and 88.8±43.5 U/L, respectively and those of normal babies were 20.5±8.5 U/L and 27.5±8.5 U/L respectively.

DISCUSSION: Birth asphyxia is a multisystem disorder. The liver too exhibits biochemical and histopathological changes. Birth asphyxia in newborn infants can cause hepatic hypoxic injury [11, 12]. The serum activity of AST and ALT is one of the more specific parameters of liver cell injury both in adults and pediatric age group [11]. According to some authors rise in transaminases indicative of liver cell dysfunction is either due to hepatocyte necrosis or due to changes in cell permeability.

Our study showed that serum AST and ALT increases more than the control group and the differences were statistically significant ($p<0.001$).

Goldberg et al showed ALT ranged from 446-3050 IU/L in asphyxiated babies [13]. Elevated ALT of more than 40 IU/L was observed by other authors.

In our study the mean±sd of AST level was 80.3±47.4 U/L and that of ALT was 88.8±43.5 U/L respectively.

Sail et.al 1990 in his study found that the serum levels of transaminases (SGOT, SGPT) and alkaline phosphatase in non-survivors were significantly higher than those of survivors [14].

Islam MT et.al.2011 in his study found that mean AST, ALT and ALP of the asphyxiated babies were 76.27±37.44, 82.16±48.08 & 369.59±123.05 U/L and that of normal babies were 23.46±8.45, 26.54±7.76 & 208.20±46.95 U/L respectively and these rise were statistically significant ($p<0.001$). The levels of AST, ALT and ALP were positively correlated with the severity of asphyxia and these correlations were also statistically significant ($p<0.001$). [14] Our observation is in close approximation to those reported by Islam et al (2011).

CONCLUSION: It can be concluded from present study that estimation of hepatic enzymes can be used as markers to diagnose the incidence of perinatal asphyxia and also to assess its severity and thus early treatment can be provided on the basis of liver function tests. Birth asphyxia is still common, more so in developing countries where obstetric and newborn resuscitation facilities are not universally available yet. Combination of dehydration, sepsis, shock and nephrotoxic drugs is not an uncommon situation in NICU. These lead to high incidences of neonatal failure. They are often reversible if identified and managed in time.

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TABLE: ALT AND AST Levels (mean ± SD) in Study and Control Group

	Study group	Control group	P Value
Serum AST	(n=70) 80.3±47.4 U/L	(n=50) 20.5±8.5 U/L	<0.001
Serum ALT	(n=70) 88.8±43.5 U/L	(n=50) 27.5±8.5 U/L	<0.001

There is significant difference in biochemical parameters of the two groups

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