Study of Liver Function Test in Perinatal Asphyxia at a Tertiary Care Center in Haryana

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ABSTRACT

Background: Perinatal asphyxia is an insult to the fetus or newborn due to lack of oxygen (hypoxia) and/or lack of perfusion (ischemia) to various organs. The diagnosis of perinatal asphyxia is mostly established retrospectively. But it is difficult to diagnose perinatal asphyxia retrospectively in the absence of perinatal records. As because of hypoxaemia, different organ systems of the body are affected in perinatal asphyxia, this study was done to assess the hepatic function in the cases of perinatal asphyxia which could prove useful in diagnosing perinatal asphyxia. Methods: The study included 25 asphyxiated neonates as cases and 25 healthy neonates as control group. Venous blood was analyzed between 2nd and 5th day of life to estimate serum alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP), serum total bilirubin (STB), direct bilirubin (DSB) and prothrombin time (PT). Unpaired student’s ‘t’ test was used for data analysis and P value of <0.05 were considered significant. Results: Serum ALT and AST were found significantly higher in asphyxiated babies compared to reference groups (p<0.001). The mean ALT and AST of asphyxiated babies were 100.17±35.50 and 84.13±44.49 U/L, respectively and those of normal babies were 30.25±9.49 U/L and 41.97±11.49 U/L respectively. Conclusions: Estimation of liver enzymes can prove helpful in diagnosing perinatal asphyxia in absence of birth details especially in developing country like India.

Key words: Birth asphyxia, Alanine aminotransferase (ALT), aspartate aminotransferase (AST).

INTRODUCTION

Perinatal asphyxia is an insult to the fetus or newborn due to lack of oxygen (hypoxia) and/or lack of perfusion (ischemia) to various organs.[1] Perinatal asphyxia is one of the leading causes of death and disability among the newborns in less developed countries like India.[2] In India, the incidence of birth asphyxia is more compared to the world and was reported to be 9%.[2] In perinatal asphyxia other organ systems in addition to the brain usually exhibit evidence of asphyxial damage. The outcome of asphyxiated babies depends on severity of hypoxia which adversely affects the liver, kidney, heart, brain and other organs.[4]

Still many studies do not include hepatic dysfunction in the multisystem involvement at all or summarize the hepatic finding as gastrointestinal problems. The reason why the clinical and scientific interest for hepatic dysfunction after hypoxia/ischemia in the newborn has been scarce could be that the liver dysfunction does not require any immediate treatment and is transient as far as we know returning to the baseline with in 10–14 days. Very few cases progress to liver failure.[3] The studies done earlier had revealed elevated hepatic enzymes in cases of perinatal asphyxia. Knowledge of this behaviour of serum ALT and AST activity in perinatal asphyxia may be helpful in those conditions where the patient is on ventilator support and it is not possible to clinically classify the patient as per the stages of Hypoxic...
ischemic encephalopathy (HIE). This may have important implications in the diagnosis and prognosis of perinatal asphyxia. This study was designed to see the effect of asphyxia on liver function tests in full term neonates.

**METHODS**

This cross sectional study was conducted in the Department of Biochemistry and Neonatal Unit of Paediatrics, Maharishi Markandeshwar Institute of Medical Sciences and Research, Ambala from January 2013 to July 2014. A total of 25 full term neonates whose age were between 2 and 5 days and having one of the following criteria: I) history of failure to breast spontaneously immediately after birth, II) history of delayed crying or not crying at all after birth, III) APGAR score <6 at 5 minutes, IV) history of under taken resuscitation procedures to sustain life after birth; and followed by evidence of hypoxic-ischemic encephalopathy (HIE) were enrolled as ‘cases’. Another 25 age and sex matched healthy neonates from pediatric department of MMIMSR were enrolled as ‘controls’. Full term newborn babies having any of the following criteria i.e birth weight less than 2.5 kg, having severe jaundice, cepsis or congenital anomalies of the hepatobiliary system, were excluded from the study.

2 mL of venous blood were taken both from asphyxiated and healthy babies between 2nd and 5th day of life to estimate serum ALT, AST, ALP, TSB, DSB and PT. ALT and AST will be estimated by kinetic IFCC method. ALP will be estimated by kinetic, Triscarbonate buffer method. TSB and DSB by Diazo method. PT determination by manual method using Thromboplastin reagent.

Data were analyzed by computer software SPSS version 21. Unpaired student’s ‘t’ test was used to measure the level of and p value of <0.05 were considered significant. Ethical clearance was taken from Ethical Committee of the institute.

**RESULTS**

Average birth weight ± SD of the study group was 2898 ±330 gms and that of the reference group was 2778 ±332 gms. Among the 25 asphyxiated patients 7(28%) were in HIE Stage-I, 12 (48 %) in HIE Stage - II and 6 (24 %) in HIE Stage III. The mean ALT, AST of asphyxiated babies were significantly different from the reference group (p <0.001). On the other hand, no statistically significant changes were noted in PT, TSB, ALP (Table-I).

**DISCUSSION**

It is well known that birth asphyxia in newborn infants can cause hepatic hypoxic injury.[11,12] The serum activity of ALT and AST is one of the more specific parameters of liver cell injury.[13] In the present study, male preponderance was seen both in the study group and the reference group. This was similar to that seen by Reddy et al (2008)[14] in their study. Another study done by Patil et al (2013)[15] also showed an increased number of males in both the groups. The cause for the increased incidence of birth asphyxia in males is not known, neither there is any study regarding the same.

In our study, there was no significant association between birth asphyxia and parity of mothers which is comparable to studies done by Reddy et al (2008)[14] and Khreisat et al (2005).[16] Meconium stained amniotic fluid (MSAF) was seen in 28% of the cases in the present study and in 8% of cases in the study done by Reddy et al (2008).[14] In both the studies, MSAF was more commonly seen in the cases than in controls.

In the present study, the mean ±SD value of serum ALT and AST in cases was 100.17 ± 35.50 IU/L and 84.13 ± 44.91IU/L respectively, while in the control group serum ALT and AST were 30.25± 9.49 IU/L and 41.97 ±11.49 IU/L respectively, the differences were statistically significant (p < 0.001). Our results were comparable to those seen by Islam et al (2010)[17] and Patilwal et al (2013).[15] In our study, 96% of the cases showed rise in ALT and 80% showed rise in AST levels. Hepatic dysfunction based on raised aminotransferases was present in 75-85% of the asphyxiated babies in different studies.[5,14,18] Saili et al (1990)[19] found deranged liver function test in 64.5% babies. Some other authors also noted similar results.[21] Goldberg et al (1979)[20] showed ALT ranging from 446-3050 IU/L in asphyxiated babies. The value of serum alkaline phosphatase (ALP) in the present study was statistically similar in both the study and the reference groups, whereas Islam et al (2010)[17] in their study found out statistically significant increase in ALP levels in the cases in comparison to the reference group.

In a study done in Edinburgh in 1989, there was no significant change in ALT during initial 24 hours period but after 24 hours, ALT increased significantly (p<0.001) reaching peak median values of 2.1 times the upper limit of reference interval by 48 hour postpartum.[20] The plasma half-life of ALT is approximately 48 hours and after hepatic damage has ceased, ALT remains increased.[21] Keeping this in mind, in this study blood samples were taken between 2 – 5 days.

In the present study, the rise of total serum bilirubin (TSB) and direct serum bilirubin (DSB) in asphyxiated newborns was not statistically significant, when compared with the reference group. Fekete et al (1978)[22] studied TSB concentration in 114 full term and 199 preterm babies suffering from either perinatal asphyxia or idiopathic indirect hyperbilirubinemia, in order to establish the effect of asphyxia on the serum bilirubin level and found that

<table>
<thead>
<tr>
<th>Hepatic function</th>
<th>Study group (n=25) Mean ±SD</th>
<th>Reference group(n=25) Mean ±SD</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum ALT</td>
<td>100.17±35.50</td>
<td>30.25±9.49</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Serum AST</td>
<td>84.13±44.49</td>
<td>41.97±11.49</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Serum ALP</td>
<td>126.22±36.49</td>
<td>125.19±34.19</td>
<td>0.919</td>
</tr>
<tr>
<td>TSB</td>
<td>5.59±1.37</td>
<td>5.19±1.02</td>
<td>0.338</td>
</tr>
<tr>
<td>DSB</td>
<td>0.95±0.35</td>
<td>0.86±0.30</td>
<td>0.333</td>
</tr>
<tr>
<td>PT</td>
<td>15.36±2.12</td>
<td>14.44±1.23</td>
<td>0.066</td>
</tr>
</tbody>
</table>

*P value

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perinatal asphyxia per se does not exaggerate hyperbilirubinaemia either in full term or in preterm babies. In the study by Islam et al (2010) the rise of TSB in asphyxiated newborns was statistically significant when compared with the study group; though total serum bilirubin was found to be within normal limit (1.80-11.80 mg/dl) in asphyxiated babies. Goldberg et al (1979) noted TSB concentration ranged from 1.1-14.3 mg/dl. In study done by Vajro et al (1997) peak levels of total bilirubin ranged from 170-220 µmol/L. In our study, the Prothrombin time (PT) in asphyxiated babies was more as compared to controls but was not statistically significant which was similar to that seen by Islam et al (2010) Godambe et al (1997) have shown reduced prothrombin index (PI) in all grades of asphyxia. Another study showed that INR increased during the first two days of life in the asphyxiated group. when compared with reference group. The main limitation of the present study was the small sample size (25 cases). Inspite of the above limitations values of ALT and AST showed statistically significant increase in asphyxiated newborn in comparison to healthy neonates.

CONCLUSION

The liver function tests (ALT and AST) may be helpful in diagnosing perinatal asphyxia especially in India where birth details are not available. Early treatment can be initiated on the basis of deranged liver function tests which may have significant effect on the morbidity and mortality of these newborns.

REFERENCES


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