

RESEARCH ARTICLE

SIGNIFICANCE OF LIVER FUNCTION TESTS IN PRETERM AND FULL TERM NEONATES

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ABSTRACT: Back ground: No single laboratory test is sufficient to have adequate specificity to find out the exact reason behind the neonatal jaundice and therefore the laboratory evidence must be used in coordination with risk factors, medical signs & symptoms. Hence, we have decided to evaluate the relevance of liver function tests in pre-term and full-term babies with neonatal jaundice. **Study design:** The present study was conducted to assess the significance of Liver function test (LFT) parameters in full-term and pre-term babies with neonatal jaundice. **Materials & methods:** The study was carried out at Kannur medical college, Anjarakandy during the year of 2017. A total of 50 newborn babies with neonatal jaundice (25 full term and 25 pre-term) were chosen for this study. Serum samples were collected and Liver Function tests (LFT) such as serum bilirubin, Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline phosphatase (ALP), Total protein (TP) and albumin were estimated. **Results:** The result showed that the serum level of total bilirubin (TB), indirect bilirubin (IDB), AST, ALT and ALP were significantly increased in pre-term than in the case of full-term neonates. There was no significant variation in bilirubin, albumin & TP level. **Conclusion:** Outcome of this study suggests that there is an observable significant variation in Liver function tests parameters in pre-term and full-term babies. The results, also indicate that preterm babies will be more prone to severe neonatal jaundice when compared to full term babies.

KEY WORDS: LFT, neonates, term pregnancy, ALT, AST, bilirubin

INTRODUCTION:

Neonatal jaundice is identified as one of the most common worldwide problem in newborn infants. Around 60% & 80% of term and preterm neonates respectively experience jaundice in the first week of birth and about 10% of breastfed babies are still affected by jaundice at the first month of their life¹¹. Neonatal jaundice is often physiological; however, a

significant minority has a diagnosis that requires specific treatment and needs to be tackled with effective measures since it may lead to a very high risk to baby's health. Moreover, no single laboratory test is sufficient to have adequate specificity to rule out the exact reason behind the neonatal jaundice and therefore the laboratory

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evidence must be used in coordination with risk factors, medical signs & symptoms. Hence, we have decided to evaluate the relevance of liver function tests in pre-term and full-term babies with neonatal jaundice. The parameters such as serum bilirubin, Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline phosphatase (ALP), Total protein (TP) and albumin were included in this study.

METHODS:

The study was carried out at Kannur medical college, Anjarakandy during the year of 2017 after getting approval from the institutional ethical committee. A total of 50 newborn babies with neonatal jaundice (25 full-term and 25 pre-term) were chosen for this study. Babies born to mothers with personal habits such as alcoholism, smoking, history of drug abuse, and infections during pregnancy were excluded from the study

Blood samples were collected through venipuncture procedures from big toe and medial-lateral position of planter surface of the foot. Tests were carried out in serum samples, free from hemolysis after centrifugation. Beckman coulter Au-480, a fully automated biochemistry analyzer with system reagents manufactured at Beckman coulter Ireland Inc., was used for the quantitative determination of

Liver Function tests such as serum bilirubin, AST, ALT, ALP, TP and Albumin.

STATISTICAL ANALYSIS:

The data produced during this study were documented and analyzed statistically (Unpaired “t” test) to establish the significance of different parameters by using Graph Pad statistical software. p- value ≤ 0.05 was taken as significant. Results were expressed as mean ±Standard deviation.

RESULTS: (Table 1)

The results showed that a significant elevated level of serum total bilirubin (TB) and indirect bilirubin (IDB) values in pre- term compared to term babies (p value is <0.0001). But serum direct bilirubin (DB) didn’t show any significant variation (p–value 0.7089) between pre-term& term babies.

The serum enzymes level such as AST, ALT & ALP were significantly higher in pre-term compared to term neonates (p–value 0.0001, 0.0093 and 0.0001 respectively).

The total serum protein levels of term and pre-term babies did not show significant statistical deviation. However, serum Albumin levels of term babies were found slightly higher, though not significant, when compared to pre-term.

Table 1: Serum level of LFT in full term and pre- term infants

Parameters	Full term (Mean ± SD)	Pre-term (Mean ± SD)	p value
Total bilirubin	10.64±2.27	18.06± 2.30	<0.0001*
Direct bilirubin	0.58 ± 0.22	0.56 ± 0.15	0.7089
Indirect bilirubin	10.64 ± 2.69	17.5 ± 2.31	<0.0001*
AST	62.29 ± 3.47	75.47 ± 4.62	<0.0001*
ALT	31.22 ± 9.89	37.39 ± 5.63	0.0093*
ALP	166.40 ± 15.98	187.21 ± 16.83	<0.0001*
Total protein	5.77 ± 0.79	5.77 ± 0.61	1
Albumin	3.52 ± 0.67	3.13 ± 0.77	0.0621
* Significant			

DISCUSSION:

Neonatal jaundice is most common neonatal dilemma around the world. The major cause is physiologic jaundice, which affects most of the newborn babies and is usually benign. However, there are many other reasons for neonatal jaundice that can be even more severe, and need systematic clinical diagnosis and assessment. The present study look at the association of Liver function test, parameters including TB, IDB, AST, ALT, ALP, TP and Albumin in neonatal jaundice that occurs in the case of preterm and full term babies. Bilirubin is the catabolic end product of heme. At physiologic pH, bilirubin is not soluble in plasma and need protein conjugation with albumin. It is excreted in bile after conjugation in the liver [4, 6, 8, 17]. Rate of bilirubin synthesized in infants is roughly more than twice the same as in adults, mainly due to relative polycythemia and increased erythrocytes turnover in neonates [6]. The mechanism behind the jaundice is similar in both pre-term and full term. There is (a) increased amount bilirubin in liver cells as the consequence of decline in red blood cells survival, raised RBC volume and augmented entero-hepatic supply of bilirubin; (b) reduced plasma bilirubin intake to liver; (c) defects in bilirubin conjugation of bilirubin. Hyperbilirubinaemia in pre-term neonates is very common, rigorous and its course is much prolonged in pre-term than in full-term babies, because of exaggerated neonatal erythrocyte, immature liver & gastrointestinal system of infants. Due to the post-natal maturation of liver intake and conjugation of bilirubin may also be sluggish in immature neonates. Moreover, an interruption by commencement of enteral feeding is general in the clinical caring of immature infants and may turn down intestinal flow and bacterial colonization leading to the added augmentation of entero-hepatic bilirubin circulation. These physiological and developmental occurrences may lead to the raised serum bilirubin level in immature infants [16].

In this study, TB and IDB level was significantly elevated in pre-term infants compared to full-term infants. Hyperbilirubinemia in infants is commonly connected with rigorous illnesses like hemolytic disorder, metabolic and hormonal imbalances, anatomical deformity of the hepatic system, and infections. It is usually due to the accumulation of un-conjugated bilirubin pigment in the skin and

mucus membranes. Depending on the causes, this condition may exist all through the neonatal life [9]. Increased level of IDB may be because of the excess bilirubin production due to hemolysis and also may be because of minimal conjugation of bilirubin in the liver owed to immature hepatic system [3, 1].

Considering the Amino-transferase activity, elevated concentration of serum AST is seen in many tissues such as cardiac and skeletal muscles, kidney, pancreas, and red blood cells [16]. In the current study, serum AST level was higher in preterm babies and statistically significant when compared to full term. Here the AST value is high possibly due to the increased breakdown of RBC's (hemolysis).

ALT is a transaminase enzyme essential in many tissues, especially hepatocytes; hence, the serum ALT level is considered as a biomarker for the hepatic function [14]. Its level was significantly elevated in pre-term babies in contrast with the full-term (10, 13). In early gestational period, serum AST and ALT levels were interrelated with infant's body weight [5]. Therefore, the serum activity of neonatal ALT showed a good correlation with intrauterine fetal growth in accordance to cellular enzyme pool [18].

ALP is used to determine how well the liver and gallbladder are functioning. ALP helps the breakdown of protein and exists in different forms, depending on where it originates (bone, kidney, small intestine, liver etc.) [11, 2, 12]. In this study the ALP level is much higher in preterm infants than full term infants and it was found to be of extreme statistical significance. Increased ALP level is usually seen in children during growth period. Walters et al, [15] also found higher ALP level in pre-term babies than term babies, showing higher prevalence of metabolic bone abnormalities in the prior group.

The TP is made up of Albumin and globulin. TP showed no considerable variations in full term and preterm infants. But serum albumin level was slightly lower (negligible and insignificant) in preterm term infants compared to full term infants; which may be because of immaturity of the liver function [5]. In fact albumin helps the transport of lipophilic bilirubin to liver for binding; and it is also showing a correlation with changes in serum direct bilirubin level in this study [7].

CONCLUSION:

Outcome of the study suggested that there is an observable significant variation in LFT parameters between preterm and full term babies. It can also be concluded that preterm babies will more prone to cause severe neonatal jaundice compared to full term babies. The results also showed significant rise in TB, IDB, ALP, AST in preterm and no significant change in ALT, TP, albumin & DB indicating the prevalence/predominance of physiological jaundice than hepatic jaundice in both pre-term & term babies. Hence, we also recommend to find out the exact reason behind neonatal jaundice that apart from measuring the serum bilirubin level alone, it is better to include other parameters (serum AST, ALT, ALP, TP, Albumin, etc) of LFT during routine diagnosis

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