Original Research Paper

Volume - 7 | Issue - 5 | May - 2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Biochemistry

Cord Blood Gamma Glutamyl Transferase Activity In Neonates - With Relation To Gestational Age, Gender & Perinatal Events

PRANATHI M — Assistant Professor, Department of OBG, BGS Global Institute Of Medical Sciences & Hospital, Bangalore - 560060.

KADAM NITU NARASING — Assistant professor, Department of OBG, BGS Global Institute Of Medical Sciences & Hospital, Bangalore - 560060.

GEETHA H — Professor of Biochemistry, Dept. of Biochemistry, Chennai Medical College Hospital and Research Centre, Trichy – 621 105, Tamilnadu, India.

ABSTRACT

Introduction: A number of steroids & proteins are currently utilised as biochemical markers of foeto placental wellbeing. Among these is the gamma glutamyl transferase (GGT) activity & its importance in cord blood. **Aim:** To study the changes in GGT activity associated with gestational age & to correlate potential alterations in GGT activity with perinatal events. **Methods:** Cord blood activity of the hepatic enzyme GGT was measured in cord blood of 300 preterm & term neonates ranging from 26 to 42 weeks of gestation & compared with maternal serum enzyme activity. **Results:** Significant rise in GGT has been found in cord blood of neonates compared to maternal serum GGT levels. **Conclusion:** GGT activity in term infants with a history of perinatal events suggestive of stress was significantly higher than in term infants without such perinatal history. Few reports to date have studied the influence of perinatal factors on neonatal serum GGT.

KEYWORDS : Gamma glutamyl transferase (GGT), Perinatal events, Cord blood

INTRODUCTION:

The biochemical tests of foeto placental wellbeing have been superseded by biophysical methods of antenatal foetal health assessments. Despite of these short comings, a number of steroids & proteins are currently utilised as biochemical markers of foeto placental wellbeing. Among these is the gamma glutamyl transferase (GGT) activity & its importance in cord blood.

The serum level of the GGT is age dependent. The upper limit of normal values in the neonate is usually reported to be between five to eight times greater than of adults [1,2] & declines to adult values over the first few months of life. A wide variation of reference ranges exists in the literature for both the foetus & neonates [3, 4, 5].

Elevated serum GGT activity is used clinically as a marker of bile duct injury in both adults & children. In addition, GGT is an inducible enzyme & numerous enzyme inducing drugs like Warfarin, Phenobarbital & Phenytoin elevates GGT levels when no evidence of hepatic disease is apparent [6,7,8].

The aim of this study is to study the changes in GGT activity associated with gestational age & to correlate potential alterations in GGT activity with perinatal events.

MATERIALS & METHODS:

Cord blood samples were collected at the time of delivery from 300 preterm & term neonates ranging from 26 to 42 weeks of gestation & compared with maternal serum enzyme activity at Department of OBG, BGS Global Institute of Medical Sciences & Hospital, Bangalore. The blood was a mixture of arterial blood coming from the infant (going to the placenta) & the venous blood coming from the placenta (to the infant). The samples were collected in plain tubes & allowed to clot. The specimens were centrifuged within 1 hour of collection & the serum separated & stored at -20 ^{0} c until being assayed.

The following perinatal information was collected: Maternal age, gravidity & parity, perinatal complications (meconium passage in utero, foetal decelerations & tight nuchal cord), route of delivery, APGAR score scores at 1 & 5 minutes, birth weight & gestational age. Perinatal history was classified as abnormal, if one or more of the following were present: maternal problems (diabetes, prolonged rupture of membrane, toxaemia) or APGAR scores of less than 6 at 5 minutes. The GGT activity was measured using Mindray B S300 fully automated analyser (with Gamma glutamyl p-nitroanalide as the substrate & Glycylglycine as the peptide acceptor).

STATISTICAL ANALYSIS:

Descriptive data are presented as means and standard deviations (SD). Data analysis between two groups was compared using two-tailed independent sample t-test. Logistic regression analysis was used for the analysis of associations between GGT and variable gestational age. Data were analysed using IBM SPSS statistics 20. $p < 0.05$ was considered as significant.

RESULTS:

Table 1: Demographic data

Gestational age (Weeks)	Number	Birth Wt (Grams)	Gender (M / F)	APGAR score	
				1 min	5 min
26 – 32	59	1240 ± 324	21/38	6.9 ± 2.2	8.4 ± 1.0
33 – 37	81	2318 ± 616	32/49	6.1 ± 2.4	7.8 ± 1.2
38 – 42	160	3221 ± 540	76/84	3.8 ± 2.8	6.1 ± 2.4

Figure 1: GGT activity related to Gestational age (both sex)

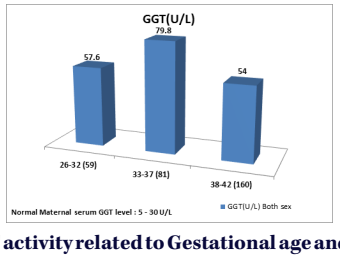


Figure 2: GGT activity related to Gestational age and gender

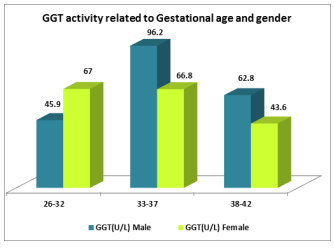
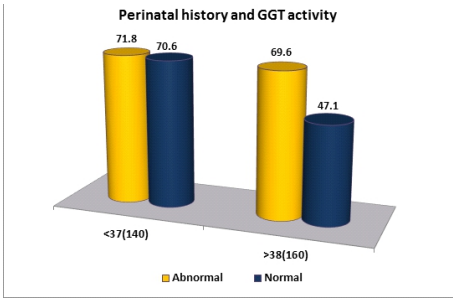


Figure 3: Perinatal history and GGT (U/L) activity



Maternal GGT Activity:

The range of maternal GGT activities was 5-30 U/ L, using a regression model, it was determined that maternal GGT activity was not influenced by any studied Variable.

DISCUSSION:

GGT was measured in cord blood of 300 preterm and term neonates ranging from 26 to 42 weeks of gestation & compared with maternal serum enzyme activity.

Significant rise in GGT has been found in cord blood of neonates compared to maternal serum GGT levels (5-30 U/L).

The enzyme activity was higher in cord blood of infants from 33 to37 weeks of gestation than in those of 26 to 32 & 38 to 42 weeks of gestation (Fig-1).

Further GGT activity in new born of 33 to 37 & 38 to 42 weeks of gestation was significantly higher in male babies than in female & the reverse was observed in 26 to 32 weeks (Fig-2).

There were no significant correlations between GGT & Apgar scores, regardless gestational age. However, GGT activity in term infants with a history of perinatal events suggestive of stress (like meconium passage in utero, foetal decelerations, tight nuchal cord or difficult delivery) was significantly higher than in term infants without such perinatal history. No such observations are observed in infants of less than 38 weeks of gestation (Fig-3).

This study thus proves that the increased cord GGT activity is attributable to minor insults to the microsomal system acquired during labour or antenatal. It also suggested that elevated cord blood GGT activity in the immediate neonatal period should be interpreted with caution & related to the perinatal history.

REFERENCES:

1. Perkins SL, Livesey JF, Belcher J, Reference intervals for 21 clinical chemistry analytes in arterial & venous umbilical cord blood. Clin Chem ;1993; 39; 1041-4.
2. Lokitch G, Halstead AC, Albersheim S, et-al,mAge & Sex-specific pediatric reference intervals for biochemistry analytes as measured with the Ektachem-700 analyser. Clin Chem; 1988; 34; 1622-5.
3. Garcia MP, Tutor JC, Sanjose ME, et-al; Cord serum gamma glutamyl transferase in new borns. Clin Biochem; 1987; 20; 269-73.
4. Rivera A, Batia J, Rassin DK, Cord blood gamma glutamyl transferase activity: effect of gestational age, gender & perinatal events. American Journal of Perinatology; 1990; 7; 110-3.
5. Richtericht R, Cantz B, Normal values of plasma gamma glutamyl transpeptidase in children. Enzyme;1972; 13;257-60.
6. Aiges HW, Daum F, Olson M, Kahn E, Teichberg S. The effect of phenobarbital and diphenylhydantoin on liver function and morphology. Journal of Pediatrics 1980;97:22–6.
7. Rosalki SB, Tarlow D, Rau D. Plasma gamma - glutamyl transpeptidase elevation in patients receiving enzyme inducing drugs. Lancet 1971;2:376–7.
8. Katrina J. Allen, Samir Y. Wassef, Ian R. Tebbett, et al, Fetal gender & cocain exposure as determinants of blood gamma glutamyl transferase activity. Journal of Perinatology; 2002;22; 133-136.