The Turkish Journal of Pediatrics 32: 21-23, 1990

GAMMA–GLUTAMYL TRANSFERASE IN NEONATAL NON–HEMOLYTIC INDIRECT HYPERBILIRUBINEMIA*

*Murat Yurdakök MD***, *Gönül Yılmazoğlu MSc****

Summary: Yurdakök M, Yılmazoğlu G. (Neonatology Unit, Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara, Turkey). Gamma-glutamyl transferase in neonatal non-hemolytic indirect hyperbilirubinemia. Turk J Pediatr 32: 21-23, 1990.

Serum gamma-glutamyl transferase (GGT) activities were determined on the third day of life in healthy controls (n:15) and in infants with non-hemolytic hyperbilirubinemia (n:16). GGT activities were 39.6±28.4 units/ml and 46.6±26.7 units/ml, respectively. There was no statistical difference between both groups (p>0.05).

Key words: gamma glutamyl transferase, newborn, hyperbilirubinemia, serum.

Gamma-glutamyl transferase (GGT) is a peptidase transfer enzyme that hydrolyzes gamma-glutamyl amides and peptides, and catalyzes the transfer of gamma-glutamyl groups to other peptides and amino acids. It is present in many mammalian tissues and body fluids, and has been shown to be a sensitive enzyme in various conditions, especially in obstructive and infiltrative hepatic disorders[1-5]. It has been reported that serum GGT activities are high in neonatal jaundice[6]. Thus, we decided to study GGT activity in newborns with non-hemolytic hyperbilirubinemia in order to determine whether this enzyme activity is a valuable indicator of the development of hyperbilirubinemia.

Material and Methods

Thirty-one infants admitted to the Hacettepe University Children's Hospital comprised the study. The infants were either born in our hospital or transferred from other hospitals. Their gestational ages were more than 37 weeks. They were all in good health except for the infants with non-hemolytic hyperbilirubinemia, who were selected as subjects for the study group. Gestational ages were determined from the mothers'menstrual histories, and neonatal assessment by

* From the Neonatology Unit, Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara.

** Associate Professor of Pediatrics, Hacettepe University Faculty of Medicine.

*** Biochemist, Hıfzısıhha Institute, Ankara.

external and neurological criteria. The infants in the study group did not require exchange transfusion. Their mean peak serum indirect bilirubin levels were 14.9±3.3 mg/dl.

Blood samples were drawn from a peripheral vein of each infant on the third day of life and collected in tubes. The serum was immediately separated by centrifugation at 2000 rpm for five minutes. The samples for GGT assays were stored at-18°C for not more than seven days. Gamma-glutamyl transferase activities were determined by the method described by Naftalin et al[7] (Procedure 545) using Sigma Diagnostics (Sigma Chemical Co., St. Louis, Mo 63178 USA). The results were expressed as the mean ± standard deviation and Student's *t* test was used for comparisons.

Results

There were eight males in the control group (n:15) and nine in the study group (n:16). The rest were females. Their birth weights were 3223±603 g and 3195±578 g, respectively ($p>0.05$).

GGT activities were recorded as 39.6±28.4 units/ml in the control group and 46.6±26.7 units/ml in the study group. There was no statistical difference between the two groups ($p>0.05$).

Discussion

Gamma–glutamyl transferase is one of the key enzymes in the gamma-glutamyl cycle. Its primary catalytic functions appear to be the cleavage of glutathione into glutamic acid and cysteinlyglycine and, acting as a transpeptidase, catalyzes the transfer of gamma-glutamyl groups to other peptides and amino acids. The amino acids so formed enter the amino acid pool of the cell for reutilization. Reduced glutathione is reformed in the gamma-glutamyl cycle, and acts as a co-enzyme in several intra-cellular enzymatic reactions[1-5].

Gamma-glutamyl transferase is found mainly in the membranes of cells that show high secretory or absorptive capacity: the epithelial cells lining the biliary tract, hepatic canaliculi, proximal renal tubules, pancreatic acinar tissue, pancreatic ductules, intestinal brush border cells. The liver is the source of most GGT activity in serum. The kidney, pancreas, and intestines contribute little to the normal activity in serum. Gamma-glutamyl transferase is cleared by the liver and excreted in the bile; a small amount is catabolized by the kidneys[1-5].

Measurement of GGT in serum is an extremely sensitive test for disorders that affect the excretory capacity of the structural integrity of the liver. It has also been demonstrated that membrane-bound GGT is induced in the liver during cholesta-

sis, and the fact that various drugs increase the GGT content of hepatocytes by this mechanism is probably the reason for microsomal induction of GGT synthesis. Persistent cholestasis caused primarily by biliary cirrhosis or other liver diseases, kidney, lung, pancreatic, and myocardial disorders, hyperlipidemia, malignancies, diabetes mellitus, hyperthyroidism, rheumatoid arthritis and also various drugs, can produce an enormous increase in serum GGT[1-5].

Although it has been reported that there is a significant correlation between serum GGT activity and bilirubin levels in neonatal indirect hyperbilirubinemia and that elevated GGT levels in the neonate may show hepatic microsomal damage with subsequent impairment of bilirubin conjugation[6], we did not find any increase in GGT activities in the newborns with non-hemolytic anemia.Increased GGT activities may play an important role, however, in the other causes of hyperbilirubinemia.

REFERENCES

1. Moniz C, Nicolaides KH, Keys D, Rodeck CH. Gamma-glutamyl transferase activity in fetal serum, maternal serum, and amniotic fluid during gestation. *J Clin Pathol* 37:700, 1984.
2. Cartlidge PH, Rutter N. Gamma-glutamyltransferase in the newborn. *Early Hum Dev* 15:213, 1987.
3. Nemesanszky E, Lott JA. Gamma-glutamyltransferase and its isoenzymes: progress and problems. *Clin Chem* 31:797, 1985.
4. Koçak N, Aksoy A, Özsoylu Ş. Erken süt çocukluğu döneminde kolestazisin klinik ve laboratuvar bulgularının değerlendirilmesi. *Çocuk Sağlığı ve Hastalıkları Dergisi* 31:243, 1988.
5. Kınık E. Çocuk ve adölesan yaş grubunda gamma glutamil transpeptidazın karaciğer hastalıklarını tanımlamadaki değeri. *Çocuk Sağlığı ve Hastalıkları Dergisi* 20:45, 1977.
6. Davidson DC, McIntosh WB, Ford JA. Cord gammaglutamyl transpeptidase activity and neonatal jaundice. *Arch Dis Child* 51:286, 1976.
7. Naftalin L, Sexton M, Whitaker JF, Tracey D. A routine procedure for estimating serum gammaglutamyl transpeptidase activity. *Clin Chim Acta* 26:293 1969.