THESIS TITLE Studies of Lipoproteins in Thalassemia Blood

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ABSTRACT

A differential density gradient centrifugation technique was developed for the separation and studies of lipoproteins in thalassemia. The method separated 7 major lipoproteins in 1 ml serum with excellent precision (cv<4.5%) in less than 10 hours.

The level and composition of serum lipoproteins were studied in 10 males and 10 females β-thalassemia/HbE patients. Ten normal volunteers in equal number of both sexes served as controls. Lipoproteins fractions were sequentially separated in 2 runs of the ultracentrifugation. Different fractions of lipoproteins were determined for the chemical contents: i.e. cholesterol, phospholipids, protein, triacylglycerol. Most of the thalassemias were clearly shown of being hypocholesterolemic. Levels of cholesterol in the serum and in almost all of the Lps fractions, namely LDL, HDL, Lp(a), HDL-2 and HDL-3 were found lower than those of normal volunteers. These abnormalities in the contents of cholesterol in thalassemias was independent of age, sex, the number of years that splenectomy and cholecystectomy were performed.

Serum thiobarbituric acid reactive substance (TBARs), a commonly used marker of lipid peroxidation in an individual was higher in thalassemia patients. This was an indicative marker of oxidative stress, resulting from the existing clinical course, eg. hemachromatosis in thalassemia. This enhanced lipid peroxidation was found to be closely related to the lowering levels of lipophilic component (cholesterol) in lipoproteins. We had identified in this study the ratio of cholesterol in HDL-2 /HDL-3 was a sensitive Lps marker for its inverse correlation with serum TBARs in healthy volunteers. Whereas in thalassemia the value of serum cholesterol was a better representation as the serum levels of cholesterol were inversely correlated with serum TBARs. It seemed that HDL-2 /HDL-3 and serum cholesterol are the two Lps markers that might be respectively represent the status of Lps in normal volunteers and thalassemia patients. Since the levels of TBARs in thalassemia showed a good correlation with the levels of serum ferritin, these two Lps markers were in fact related to the pathophysiological basis of thalassemia syndrome. Oxidative stress and/or iron overloading was evidently higher in thalassemia with respect to either one of these two parameters (serum cholesterol & TBARs). The evidence that hypocholesterolemic nature of thalassemia could be grouped with those that carried an independent risk factor of CHDs as their HDL cholesterol fell bellowed the critical level of 35 mg/dl. It was concluded from this study that the dyslipoproteinemia in thalassemia was resulted from the excessive oxidative stress and the status of Lps could be an associated underlining pathophysiologic factor in thalassemia syndrome.