IOSR Journal of Applied Chemistry (IOSR-JAC)
e-ISSN: 2278-5736.Volume 9, Issue 11 Ver. II (November. 2016), PP 08-10
www.iosrjournals.org

Lipid status in adult Iraqi Patients with β-Thalassemia Major and Intermedia

Qais M. Abdulhameed[1,] and Hassanain K. Al-Bairmani[2]
[1] *M.Sc. student at Chemistry department, College of science, university of Al-Mustanseriah*
[2] *Lecturer in biochemistry, Chemistry department, College of science, university of Al-Mustanseriah*

Abstract: *β-Thalassemia is hereditary blood disorders characterized by reduced synthesis of the beta chains of hemoglobin resulting to microcytic hypochromic anemia. Hypocholesterolemia is reported in recent studies in other countries. We estimated the level of triglyceride (T.G.), total cholesterol, high density lipoprotein (H.D.L) and low density lipoprotein (L.D.L) for seventy three patients with β-Thalassemia major(TM), (42 male and 31 female) and twenty patients with β-Thalassemia intermedia (TI), (10 Male and 10 Female) with thirty healthy participants (15 Male and 15 Female) as a control in Iraq, Their ages range was 18-30 years. The results show the level of all cholesterol species for TI is significantly decrease as comparison with TM and the last one is significantly decreases as comparison with control group. We found no association of serum lipid profile with age, sex, Hb and platelets.*

Keywords: *β-Thalassemia, Hypocholesterolemia, cholesterol and triglyceride.*

I. Introduction

β-Thalassemia can be defined as a condition in which a reduced rate of synthesis of the beta globin chains leads to imbalanced globin-chain synthesis, defective hemoglobin production, and damage to the red cells or their precursors from the effects of the α-globin subunits that are produced in relative excess [1]. This difference in globin chain synthesis leads to severe hemolytic anemia in which life can only be continued by regular blood transfusions [2]. Thalassemia intermedia is defined a patients with β-thalassemia that have mild clinical symptoms of the disease is somewhere between the β-thalassemia trait and the severe manifestations of β-thalassemia major [3]. Infections such as HBV, HCV, and HIV can be observed due common transfusions in patients with β-Thalassemia major [4]. Different endocrine, cardiac, and hepatic diseases may occur in thalassemia patients as a result from iron overload [5]. In recent study, all specious of cholesterol had been reported decrease in children with β-thalassemia patients with elevating in level of triglyceride [6]. The metabolic bases of this abnormality still unclear and several mechanisms have been suggested as clarification for the lipid abnormalities: anemia, liver dysfunction, iron overload and oxidative stress [7]. In this study, the authors determined serum lipid profile in two groups of Iraqi β-Thalassemia patients (TM and TI) and compared the result between them and also the results of each group were compared with healthy control group. In addition, the authors evaluated the levels of Hb, platelets, to investigate if any association between lipid profile with hematological variables and also match the results with sex and age.

II. Materials and methods

2.1. Subject

The Samples were conducted in (Ibn- Balady Hospital/Baghdad) during the Period from November 2015 to March 2016.

They have been classified as the following:

- Group one: β-Thalassemia Major (TM) as pathological they were diagnosed by specialist physicians depending on the laboratory analysis of blood film, Hb-electrophoresis and biochemical iron study, Included 73 patients (42 male and 31female) their ages range 18-30 with a mean age(22.99 years).
- Group two: β-Thalassemia Intermedia (TI) as pathological they also were diagnosed by specialist physicians depending on the same laboratory analysis that used in diagnosing of β-Thalassemia Major but they are less than Thalassemia Major in their needing to blood transfer. This group included 20 patients (10 male and 10 female) their age range 18-30 with a mean age (23.6 years).
- Group three: Control group healthy individuals included (15 male and 15 female), their ages range 18-27 years with a mean age (22.93 years) no previous disease which may interfere with the parameters analyzed in this study.

2.2. Blood sampling

Five millimeter of venous blood was withdrawn by disposable syringes with stainless needles, divided into two portions. First portion was transferred to plain tube containing (ethylenediaminetetraacetic acid disodium) salt (EDTA) as anticoagulant for determination of hemoglobin and platelets, the second portion was transferred

to plain polyethylene tube containing gel as a clot activator for serum separation.The second portion was centrifuged at 4000 rpm for 10 minutes, and the serum was separated immediately and stored at -75 ^{o}C and used later to determined lipid profile.

2.3. Laboratory assessment

The levels of hemoglobin and platelets count were determined by using hematology auto analyzer (MS_9), and the concentration of T.G. and Cholesterol were measured by using enzymatic-colorimetric methods (Randox kits)[8,9] . Measurement of HDL was determined by precipitating LDL, VLDL and chylomicron by addition of phosphotungstic acid in the presence of magnesium ions. Low density lipoprotein (LDL) was examined by using the Friedewald equation [10].

2.4. Statistical analysis

The inputting and analyzing data were done by using SPSS (20). All results were readout as Mean±SD and ANOVA one step test was used to find out the significance among the studied groups for each parameter. The correlation was calculated by bivariate correlation test.
The table

III. Results

(1) reveals the levels of hematological parameters and the lipid parameters for the three study groups. The results show high significant decreasing in the levels of Hb in the two patients as compared with control group. The levels of platelets show significant increasing in the two patients groups when compared with control and the level of this parameter in TI patients was higher than TM patients.Triglyceride results reveal high significant increase in two patients groups as compared with control group. The levels of total cholesterol, HDL and LDL are high significantly decreased in TI and TM when compared with control group and it is more decreasing in TI. No correlation of lipid profile to the sex, age and hematological parameters was noticed.

Table 1: the result of Hb, platelets and lipid profile in the three studied groups expressed as (mean±SD).

Parameters	Control	TI	TM	P-value
Hb	12.88±1.16	8.15±1.53	8.04±1.49	**<0.001****
Platelets	243.07±38.84	374.6±181.39	364.47±188.7	**0.002***
Triglyceride	92.84±39.009	162.32±72.357	171.56±69.714	**<0.001****
Cholesterol	185.32±40.963	126.97±37.84	144.37±57.621	**<0.001****
HDL	33.330±9.3026	14.780±5.6494	14.941±6.6979	**<0.001****
LDL	133.4187±36.8666	79.726±34.6976	95.114±52.7646	**<0.001****

IV. Discussion

Lipids are necessary to save life of cells because it is important sources of energy. A lipid profile is determination of the level of specific lipids in the blood.Two important lipids, cholesterol and triglycerides, are cycled in the blood by lipoprotein compounds. The lipoprotein particles are measured with a lipid profile. It is divided by their density into high-density lipoproteins (HDL), low-density lipoproteins (LDL), and very low-density lipoproteins (VLDL) [11].Hypocholesterolemia in all phenotype of thalassemia patients has been reported since the beginning of the20th century [12-21]. Our result agree with the study of Hartman et al., that explain TI patients showed significantly lower TC, HDL-C and LDL-C compared with TM, and TM lower than control group. No clear explanation was proposed for the reported lipid abnormalities in TI patients; accelerated erythropoiesis and enhanced cholesterol consumption were suggested as the more acceptable mechanism implicated in the hypocholesterolemia of TI patients [22].Hypertriglyceridemia in thalassemia patients that's obtained in our results is in agreement with Al-Quobaili and AbouAsali, Seham M. et al. and Hartman et al. They suggested that anemia places the thalassemic patients at risk for decreased extrahepatic lipolytic activity, resulting in high serum triglycerides [23,24].

V. Conclusion

Lipid profile examination shows significant decreasing in cholesterol levels of the two patients groups when compared with control, the levels of cholesterol in thalassemia intermedia were significantly decrease when compared with thalassemia major patient, the acceleration of erythropoiesis enhanced cholesterol consumption is more acceptable suggestion for these result.

References

[1]. Weatherall, David J., The Thalassemias: Disorders of Globin Synthesis. In Lichtman MA, Kipps TJ, Seligsohn U, Kaushansky K, Prchal, JT. *Williams Hematology (8e ed.),*2010

[2]. Economou M, printza N, Teli A. Renal dysfunction in patients with beta-thalassemia major receiving iron chelation therapy either with deferoxamine and deferiprone or with deferasirox. Acta Haematol 2010; **123**:148–152.

[3]. Cohen AR1, Galanello R, Piga A, De Sanctis V, Tricta F. Safety and effectiveness of long-term therapy with the oral iron chelator deferiprone. Blood 2003;102:1583–1587.

[4]. Chen, An-Chyi, et al. "Effect of deferiprone on liver iron overload and fibrosis in hepatitis C virus-infected thalassemia." *Hemoglobin* 30.2 (2006): 209-214.

[5]. Ferrara, Mara, et al. "Cardiac Involvement in β- Thalassemia Major and β- Thalassemia Intermedia." *Hemoglobin* 28.2 (2004): 123-129.

[6]. Amal I. Hassanin et al; Disturbances of Lipid Profile and Serum Ferritin Levels in Thalassemic Children. *Current Science International*: 4:2: (2015) 178-183.

[7]. Livrea, M. A., et al. "Oxidative modification of low-density lipoprotein and atherogenetic risk in β-thalassemia." *Blood* 92.10 (1998): 3936-3942.

[8]. Jacobs, N. J., and P. J. VanDemark. "The purification and properties of the α-glycerophosphate-oxidizing enzyme of Streptococcus faecalis 10C1." *Archives of Biochemistry and Biophysics* 88.2 (1960): 250-255.

[9]. Roeschlau, P., E. Bernt, and W. Gruber. "Enzymatic determination of total cholesterol in serum." *Zeitschrift fur klinische Chemie und klinische Biochemie* 12.5 (1974): 226-226.

[10]. Friedewald, William T., Robert I. Levy, and Donald S. Fredrickson. "Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge." *Clinical chemistry* 18.6 (1972): 499-502.

[11]. Richard A. Harvey, and Denise R. Ferrier. *Lippincott's Illustrated Reviews: Biochemistry" 5th ed*. (2011) p:173

[12]. Aziz, Bassm N., Mohammad A. Al-Kataan, and Wasan K. Ali. "Lipid peroxidation and antioxidant status in β-thalassemia patients: Effect of iron overload." *Iraqi J Pharm Sci* 18 (2009): 8-14.

[13]. Fessas, Phaedon, G. Stamatoyannopoulos, and Ancel Keys. "Serum-cholesterol and thalassaemia trait." *The Lancet* 281.7292 (1963): 1182-1183.

[14]. Mayo, O., et al. "Genetical influences on serum-cholesterol level." *The Lancet* 298.7723 (1971): 554-555.

[15]. Zannos-Mariolea, L., et al. "Relationship between tocopherols and serum lipid levels in children with beta-thalassemia major." *The American journal of clinical nutrition* 31.2 (1978): 259-263.

[16]. Giardini, O., et al. "Serum lipid pattern in β-thalassaemia." *Acta haematologica* 60.2 (1978): 100-107.

[17]. Katerelos, C., Constantopoulos, A., Agathopoulos, A., Constantzas, N., Zannos-Mariolea, L., & Matsaniotis, N. Serum levels of retinol, retinol-binding protein, carotenoids and triglycerides in children with β-thalassemia major. *Acta haematologica*, *62*(2), (1979). 100-105

[18]. Maioli, M., Cuccuru, G. B., Pranzetti, P., Pacifico, A., & Cherchi, G. M. Plasma lipids and lipoproteins pattern in beta-thalassemia major. *Acta haematologica*, *71*(2), (1984). 106-110.

[19]. Maioli, M., Pettinato, S., Cherchi, G. M., Giraudi, D., Pacifico, A., Pupita, G., & Tidore, M. G. Plasma lipids in beta-thalassemia minor.*Atherosclerosis*, *75*(2-3), (1989). 245-248

[20]. Goldfarb, A. W., Rachmilewitz, E. A., & Eisenberg, S. Abnormal low and high density lipoproteins in homozygous beta- thalassaemia. *British journal of haematology*, *79*(3), (1991).481-486.

[21]. Maioli, M., Vigna, G. B., Tonolo, G., Brizzi, P., Ciccarese, M., Donegà, P., ... & Fellin, R. Plasma lipoprotein composition, apolipoprotein (a) concentration and isoforms in β-thalassemia. *Atherosclerosis*, *131*(1), (1997). 127-133.

[22]. Hartman, C., Tamary, H., Tamir, A., Shabad, E., Levine, C., Koren, A., & Shamir, R. Hypocholesterolemia in children and adolescents with β-thalassemia intermedia. *The Journal of pediatrics*, *141*(4), (2002). 543-547.

[23]. Al-Quobaili, F. A., & Asali, I. E. A. Serum levels of lipids and lipoproteins in Syrian patients with beta-thalassemia major. *Saudi medical journal*, *25*(7), (2004). 871-875.

[24]. Ragab, S. M., Safan, M. A., & Sherif, A. S. Lipid profiles in β thalassemic children. *Menoufia Medical Journal*, *27*(1), (2014). 66-72.