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Serum levels of lipid and lipoproteins in patients with beta- thalassemia in Amara S.Iraq

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Abstract

Lipid profile was estimated in sera of patients in major thalassemia (Tmajor),minor thalassemia (Tminor) compared with control group. 95 individual (26minor),(29major) was admitted to thalassemic center in Amara city .S.Iraq ,and 40 healthy as control group. Lipid profile which include Cholesterol (Ch),Triglyceride(TG),Phospholipid (Ph.L),Total lipid (T.L),High density lipoprotein -Cholesterol (HDL-C),Low density lipoprotein-Cholesterol (LDL-C),Very low density lipoprotein-Cholesterol (VLDL-C) .In our study there were found increase levels of Ch,TG,HDL-C,VLDL-C and total lipid in sera of both patient groups compared with control,while alower of LDL-C and Ph.L levels was found in sera of minor and major thalassemia patients.

Introduction

Thalassemia is an inherited impairment of hemoglobin production, in which there is partial or complete failure of synthesis aspecific type of globin chain[11],the defect may affect the α,β,γ and δ chain or may affect some combinatin for this type , and named according to the type of chain defect[20]. The β-thalassemia was the most familiar type in which the β globin chain synthesis is impaired, the β-thalassemia mainfest clinically has three major group , β thalassemia major, β thalassemia itermedia and β thalassemia minor [7] .

Lipids are hetrogeneous group of comounds which are relatively insoluble in water but dissolive in non-polar organic solvents. The acyle glycerol constitiunte the majority of lipids in the body ,triglycerids are the major lipids in fat and food deposite[4].

During the previous years some scintific evidences have raised the adverse effect abnormal blood lipid levels ,like total cholesterol and other lipids and lipoptoteins on agenetic disease [22]. At this point the relationships between blood lipids and genetic disease might be influenced by several other lifestyle- related factors like glucose intolerance , dietary habits[8]

It was established that β thalassemia has amajor impact on plasma lipids and lipoproteins.In sever β thalassemia(Tmajor,Tminor)hypocholest erolemia caused by amarked reduction of both LDL-C and HDL-C cholesterol has been consistently reported[9,13] .A wide study conducted in the thalassemia patients not only showed that β-thalassemia carriers have a lower total and LDL-C than do controls but also showed a small significant reduction of apo B and apo A-I levels and bordline changes in lipid and protein composition in DL-C,HDL-C,and phospholipids[15]. It has been suggested that the mild lipidemia found in carriers of β thalassemia might contribute to the protection of these individuals from the development of premature CAD [19,18].Retrospective studies showed that the prevalance of thalassemia carriers among patients with myocardial infraction was much less than expected[19]. To the best our knowledge data regarding the distribution of blood lipids levels among patients with β thalassemia were obscure .Therefor we investigated the distribution of total lipid ,lipoproteins,cholesterol,triglycerids, phospholipids levels in a sample of patients with β-thalassemia in Amara city (S. of Iraq).

Materials and Methods

Forty normal healthy subjects were the control group from the university and hospital staff with no general complications and receiving no medication whose ranged their ages from (4to30)years (mean±SD=10.9±9.4).Fifty five thalassemia patients aged from (1.5to29)years (mean± SD=9.4± 8.71), the patients groups were divided into three subgroups according to their age, eleven patients (1.5to10)years, twenty three pateints (11to20) years, and twenty one patients (≥21) years and another divided into two subgroups according to the type of the β thalassemia,twenty six patients as (Tmajor)and twenty nine pateints as (Tminor).

Blood from thalassemic patients who attended the thalassemia center in the Al -Sadder-hospital from Amare city.After clotting ,serum was separated by centrifugation and divid in several aliquots , stored at -20C° until use for further biochemical determination.

We measured serum cholesterol (Ch), Triglycerid(TG),High density lipoproteins(HDL), ,Phospholipid (Ph,L) and total lipids were performed by using the enzymatic reagent standard kits (Randox , Bio merieax and Biolabo kits) Low density lipoproteins(LDL), Very low density lipoproteins(VLDL) were calculated by the Freidewald formula.

All data were expressed as the Mean± SD,the SPSS for windows program for statistical analysis were used. Differences were considered significant when $p \leq 0.05$

Results and Discussion

The overall charcteristics of all subjucts participated in this study are presented in table (1).

Table1:Charcteristics of all subjects group in this study

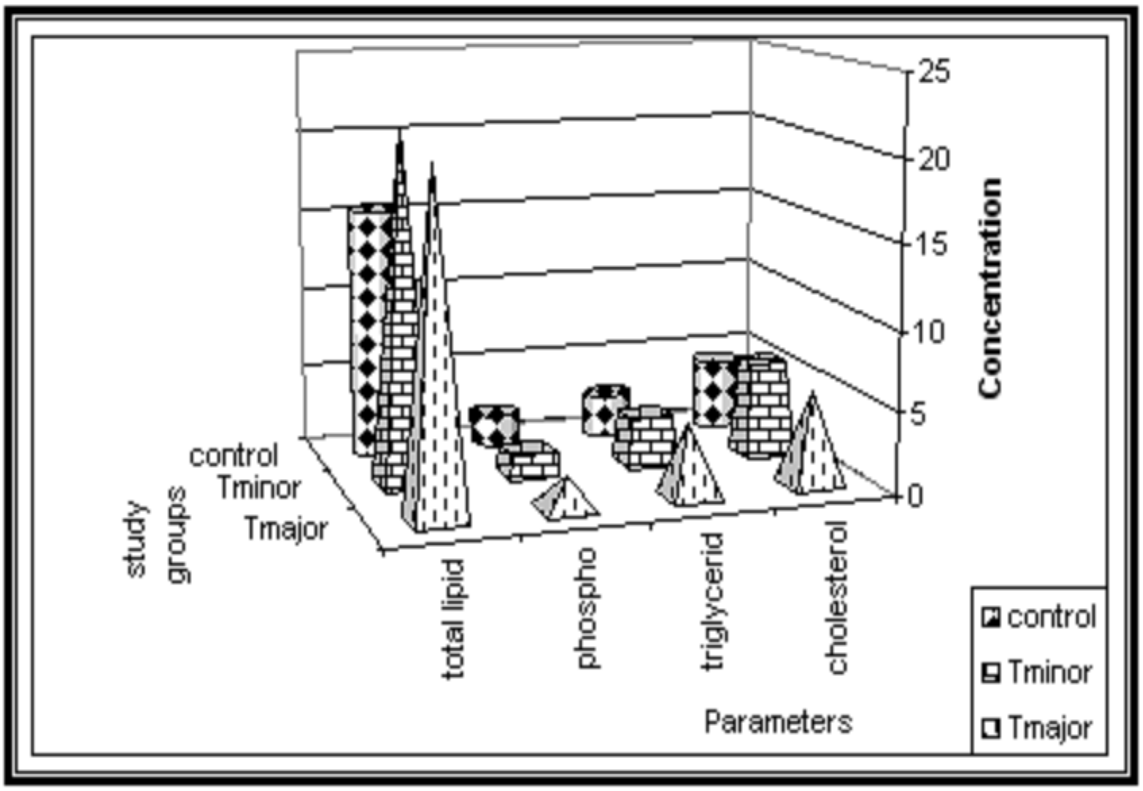
Variables		Control		Tminor		Tmajor	
		N=40	%	N=29	%	N=26	%
Age(years)	1.5-10	10	25	7	24	4	15
	11-20	12	30	10	34	13	50
	≥21	18	45	12	41	9	35
Sex	Male	27	67	18	62	17	65
	Female	13	33	11	38	9	35
BMI	Kg/m^2	24.9	/	22.78	/	23.05	/
Hb	%	14.6	/	9.7	/	8.05	/

The patients with β thalassemia major shown a significant increased of serum total cholesterol(Ch) and triglycerids (TG) levels compared to minor thalassemic an control was found in table (2) .While the total lipids level in both subgroups of thalassemic patients was highly increased significant as compared with control healty groups, but the phospholipid levels was significant which decreased found in minor thalassemic ,as well as the concentratuon of hemoglubin (Hb%) . was also significantly lower in both type of thalassemic compared to normal control subject , table(1),fig 1, $p \leq 0.05$

Table 2:Lipid profile level in sera of three studied groups

Paremeters(mmol/L)	Controls	Tminor	Tmajor
Total cholesterol	**4.45±021**	**6.1±0.41***	**5.91±0.91***
Triglycerids	**2.76±0.15**	**3.26±0.45***	**4.41±0.61***
Phospholipids	**2.1±0.3**	**1.1±0.21***	**1.9±0.1**
Total lipid	**7.5±1.8**	**10.5±0.3***	**15.5±1.2***

All data were expressed as the Mean± SD,* $p \leq 0.05$



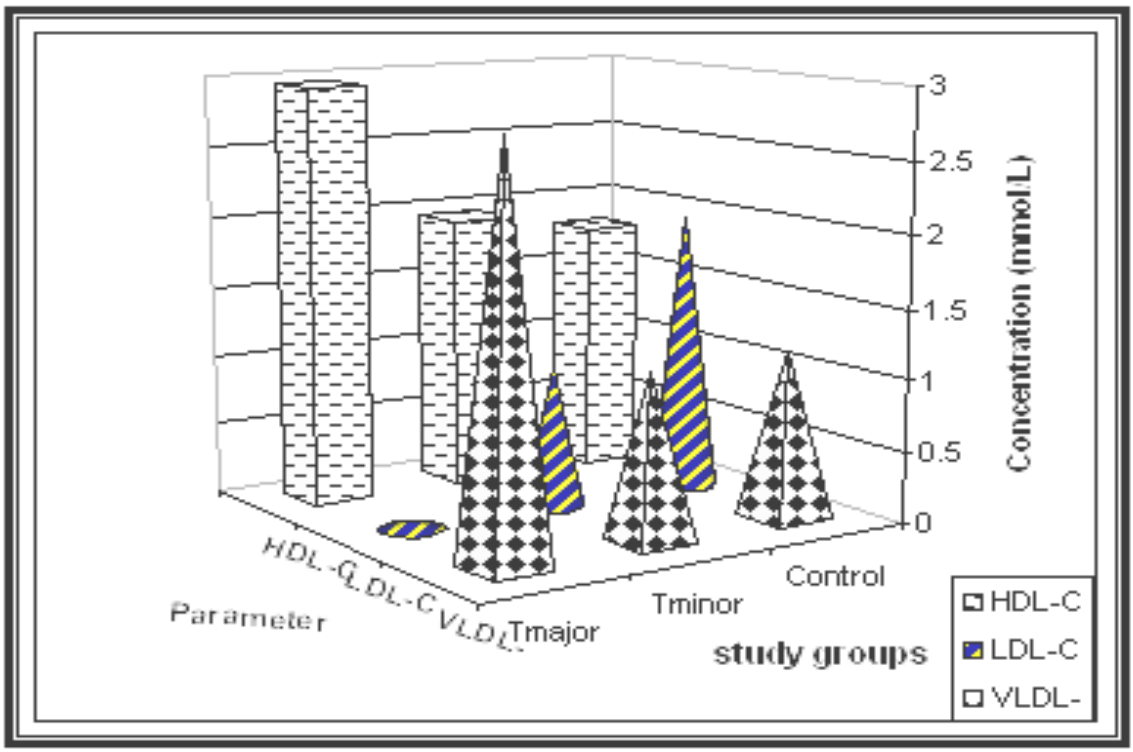
Figure(1);Distribution of lipid profile levels in sera of three studied groups.

The mean levels of lipoprotein (HDL-C,LDL-C,VLDL-C) in sera of control and minor ,major thalassemic were abbreviated in table (3) that showed a significant increased of HDLC levels of major thalassemic compared to minor and control. On the other hand, compared conterol group and major thalassemic a significant decreased in LDL-C levels in sera of minor thalassemic (table 3,fig 2) $p \leq 0.05$.

Table 3: lipoproteins levels in sera of three studied groups

Paremeters(mmol/L)	Controls	Tminor	Tmajor
HDL -C	1.80±0.1	1.95±0.21	2.95±0.35*
LDL -C	2.00±0.1	1.01±0.1	0.51±0.23*
VLDL -C	1.19±0.81	1.17±0.20*	2.79±0.39*

All data were expressed as the Mean± SD,* $p \leq 0.05$



Figure(2);Distribution of lipoprotein levels in sera of three studied groups

As it is known that the age is a factor which correlates well with blood lipid levels.In our study showed the age was positively and significantly associated with all blood lipids measurements in both men and women by the exception of HDL-C levels which is nearly compatible with other studies[16,4].Some studies have showen that decade difference in age was associated with 7mg/dL higher total choleserol levels,12mg/dL for higher triglyceride levels and 7 mg/dL higher HDL-C levels but only 2.5mg/dL lower LDL-C levels ($p \leq 0.01$)[5,9], finding in our current study agreement with this researches. Additionaly,mean body mass index (BMI) was with in normal rang (i.e 25 kg/m^2) as result,obesity prevailed in less than 2% of the patients. In this work we evaluated the distribution of several blood lipids and lipoproteins in a sample of β-thalassemic pateints. To knowledge the distribution of blood lipids and lipoproteins among patients with these disorder were presented for the first time in the nude literature .In contrast, a considerable proporation of the patients had increased cholesterol ,HDL-C and TG levels.In addition to LDL-C,as well as phospholipid were substantially low.All those finding obtaind from this study about lipid profile were compared with other investigate ,Papanstasion *et al* (1996) studied atotal of (104) pateints with minor and major thalassemia and compared them with (112) as control group investigators reported that total cholesterol ,HDL,and LDL-C was significantly decreased,while triglycerids were significantly increased in the thalassemic patients compared to the control subjects and also found opsitive correlation between the age and TG levels[17] .Maioli *et al* (1984) studied 70 individuals with beta-thalassemia from Italia found that these patients disclosed significantly lower total cholesterol,LDL-C,HDL-C apoA,apoB levels and higher triglyceride concentration in this patients[13]. Al-Quobaili (2004) was observed in the Syrian thalassemic pateints (Tmajor) that included 30 patients and 30 control were studied had significantly lower total cholesterol,HDL-C,and lower LDL-C levels compared with control ,while serum TG and lipoprotein(a) levels were higher in β thalassemia than control[1]. However,our data in a number of thalassemic pateints , the explanation of this observated is that only 65% of major thalassemic pateints had total serum cholesterol≥200mg/dL and 45% of the pateints had triglycerid levels≥150 mg/dL.

During the prior some researches reported a normal lipid (i.e. total cholesterol and triglyceride) in patients with β thalassemia,they also reported abnormal distrbution is not more than3% of the total number of pateints (total number 192 patients) [22] .In accordance with the previous findings (Ch,TG levels) leads to the suggest that roughly 65% of men and women with the same age of our patients had high total cholesterol ,its could be that dietary origin and in hypercholesterolemia in β-thalassemia was an outosmal codominant disorder that is due to defects of the low density lipoprotien receptor or (LDL-R) that result in adefective removal of LDL from plasma (repersentative low LDL levels).Whereas the elevated TG levels in Tmajor roughly ten out seventeen men and eight out of nine women had TG levels greater than normal rang value,that approximatly (59% men,89%women), we assume that thalassemic men and women have

similar prevelence of high Ch and TG levels. In contrast, Maioli etal 1984 reported that 17%of men and women of the same age with Tmajor patients had total cholesterol levels above 200 mg/dL and triglyceride levels in the normal rang value[8].

Based on recent in our observations,showing their lower significant chenges in phospholipid levels , the same finding was reported in otherstudy,Gianini *etal* (1984) observed that total serum phospholipids were significantly lower among patients with thalassemia .These changes confirm the suggestion that referred to hepatic damage and to metabolic disorder leads to sever anemia[9]

In the present study , we have had the chance to a scetain the mild LDL-C lowering effect produced by the β-thalassemia(Tminor) , in our study the results accordance with others workers[14,2],serum LDL-C of this patients(Tminor),who had no clinical or laboratary signs of liver disease (acondition that might have reduced the hepatic production of apoB containing lipoproteins),was much lower then that observed in the Tmajor patients.On the contrary, the Panagiotakos and *etal*(2004) repoted that 17%of men and15%women of the same age had LDL-C levels above 130mg/dL in the β thalassemia Tmajor in Greece[16].

Our justification ,the causes which were responsible of disorder in lipoproteinemia (Low LDL and high HDL levels) in this study according to literatures, there are two mechanisms migh account for LDL-C lowering effect of β-thalassemia in (Tminor);the first, the mild anemia , is expected to induce the secretion of erythrpoietin, which stimulates the differentiation of the erythroid progenitor cells in the bone marrow that leading to mild erythroid hyperplasia[12],the combined effect of erythroid hyperplasia and increased number of wild-type LDL-R per cell might increased the receptor – mediated removed of plasma LDL in the bone marrow, thus reducing the expected elevation of plasma LDL[21].The second mechanism may be associated with activation of the monocyte/macrophage system in various districts of the body this chronic mild creation of the macrophage system might be to decreas LDL-C levels and increased HDL-C level in the plasma[10].

Then again , LDL-C refer to aclass and range of lipoprotien particles varying inthier size and content which was carred cholesterol in the blood and around the body for use by the cells.It was the stage of VLDL which is produced by the liver,LDL is formed as VLDL lipoprotiens which lose triglycerid through the action of lipoprotien lipase (LPL) and become smaller and denser containing a higher proportion of cholesterol .Low concentration of large LDL particles is the healthy pattern[3].Conversely,high concentration of small LDL particales inspite of the same total cholesterole content correlates with much growth fasters of atheroma and progressively of atherosclerosis[6].

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الـخلاصة

تم تقدير صورة الدهون في بعض أمصال مرضى البيتا ثلاسيميا فقر الدم البحري (الصغرى والعظمى) متماثـل Tminorو٢٩الى Tmajor,٢٦ مريض الى ,الأبوين ومجموعة السيطرة. شملت هذه الدراسة (٩٥) شخصا من مراجعي مركز الثلاسيميا في مدينة العمارة جنوب العراق ومقارنتهم مع ٤٠ شخصا كمجموعـة السـيطرة والـدهون (Ph.l) والـدهون الفوسـفاتية(TG)) والكليسريدات الثلاثيةCh.تضمنت الدهون(الكوليسترول (واللايبوبروتينـات (LDL) اللايبوبروتينات واطئة الكثافة (HDL) و اللايبوبروتينات عالية الكثافة(T.l)الكلية وكذلك بالدهون Ch,TG,HDL-C,VLDL-C . أظهرت النتائج زيادة في مستويات(VLDL))ضئيلة الكثافة (LDL-C,Ph.L) في أمصال مجامع ا لمرضى مقارنة بمجموعة السيطرة, بينما كانت مستويات(T.L)الكلية في أمصال مجامع المرضى اقل مما هو عليه في مجموعة السيطرة.