Immunoglobulines and complements levels in sera of patients with thalassemia

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Abstract

This study designed to analyzed humoral response related to measuring the serum levels of immunoglobulines (IgG , IgM and IgA) and complements corporeats (C3 and C4) in (20) thalassemic patient and (10) control subject.

IgG only recorded a high significant differences between two studied group – whereas no significant differences were found in levels of remaining humoral components (IgM , IgA , C3 and C4) between thalassemic patients and control group .

key words: thalassemia, Immunoglobulin, complements, humoral

الخلاصـــة

صممت هذه الدراسة لتحليل الاستجابة المناعية الخلطية المتعلقة بقياس مستويات الكلوبيولينات المناعية (IgG , IgM , IgA) وكذلك مكونات المتمم (C3 , C4) في مصول (20) من المرضى المصابين بالثالاسيميا و (10) من السيطرة .

وقد لوحظ بان مستويات IgG فقط سجلت فروقات معنوية عالية مجموعتي الدراسة . بينما لم يسجل أي فارق معنوي في مستويات بقية المكونات الخلطية (IgG , IgM , C3 , C4) بين مرضى الثالاسيميا و السيطرة .

الكلمات المفتاحية: الثلاسيميا، المناعي،

Introduction

Thalassemia an inherited anemia associated with the diminished or absent expression of either α - or β – globin genes (Wetherall and Clegg , 1981) . Alpha thalassemia occur most commonly in persons from southeast Asia , the Middle East , China in those of African Americans – While beta type occur in persons of Mediterranean origion and to alesser extent , Chinese , other Asians and African Americans . There are many forms of thalassemia – Each type has many different subtypes . Both alpha and beta thalassemia include the following two forms . Thalassemia minor which occurs if the person receive the defective gene from only one parentr , persons with this form of disorder are carriers of the disease and do not have symptoms . Thalassemia major developed when person inherit the defective gene from both parents (Forget and Cohen , 2005 & Debaun and Vichinsky , 2007).

Amajor cause of morbidity and mortality in thalassemic patients , assumed to be the result of immunological changes (Ezer , *et al* . 2002).

Immunological abnormalities including decreased opsonization and granulocyte phagocytosis have been documented (Sinniah and Yadav , 1981 & Tovo , *et al* . 1981) .

The immunological defects observed in patients with thalassemia major make theme susceptible to different kinds of infection , both before and after spleenoctomy (Kutukculer , *et al* .1996)

Various immunological abnormalities are reported in previous studies such as decreased opsonization and granulocyte phagocytosis (Weatheral , 1980) , increased serum immunoglobulines levels (Weathland and Clegg , 2000 & Wetherland , *et al* . 2000) and alterations in B and T cell number and function (Fessas , 1963 & Chalevlakis , *et al* .1975). While pattana pnnyasat ,*et al* .(2000) indicated that thalassemia patients , during the steady state of disease , appear to have normal T-lymphocyte function with only moderate abnormalities of T- and B- lymphocyte

subsets . Also Fang , *et al* . (2009) recorded that serum specific panel reactive antibody might have an apparent inhibition effect on proliferation and differentiation of cord blood $CD34^+$ cells .

Al-Basrah resides on the thalassemia and have large number of patients , So recent project was designed to evaluate the level of immunoglobulines (IgG . IgM and IgA) and complements components (C3 and C4) in thalassemic patients in Basrah province .

Materials and Methods

In recent study venous blood samples were collected from (20) patient with thalassemia which designed by physician in center of genetic blood researchs in Basrah . The age of patients ranged between (10 – 20) years .

Ten blood samples were collected from normal subject and considerd as control group .

Sera were obtained by centrifugation of blood for 15 minute at 1500 rpm .

Levels of immunoglobulines (IgG , IgA and IgM) and complements components (C3 and C4) was measured in patient and control sera by using single radial immunodifussion (SRID) kit from LTA (Italy) .

The work was done as follows :

1- All plates were opened then 5 µl of serum was put in each well of each plate.

2- The plates were covered and stored at a moist chamber .

3- The precipitating ring was measured by immunoviewer then the concentration of each humoral components was detected by using the reference table which contain the concentration value corresponding to precipitating ring diameter .

Statistical analysis

Data was analyzed by using analysis of variance test (ANOVA) (Walpole,1982) .

Results

The results demonstrated that there was highly significant differences ($P < 0.01$) in mean concentration of IgG between patients (1591.2) mg / dl and control (1035.4) mg/dl .

Table (1)

Table (1) : Mean concentration of IgG in sera of thalassemic patients and control group .

Group	Number No.	Range	Mean	SD ±	S.E.
Patient	20	786.7 – 2542.6	1591.2	407.5	91.122
Control	10	161.4 – 1563.4	1035.4	402.2	127.19

N.V. 800 – 1800 mg/ dl

Although there was no significant differences in mean concentration of other two investigated immunoglobulines (IgA and IgM) between patients (270.2 and 273.15) and control group (210.1 and 2.55.17) respectively , but in some patients the values of previous immunoglobulines showed a high level more than those of normal value table (2 , 3) respectively .

Table (2) : Mean concentration of IgA in sera of thalassemic patients and control group .

Group	No.	Range	Mean	SD ±	S.E.
Patient	20	47.4 – 766.5	270.2	208.7	46.66
Control	10	79.1 – 295 . 3	210.1	80	25.3

N.V. : 90-450 mg/dl

Table (3) : Mean concentration of IgM in sera of thalassemic patients and control group .

Group	No.	Range	Mean	SD ±	S.E.
Patient	20	91.7-471.0	273.15	90.17	20.163
Control	10	148.6-385.3	255.17	99.26	31.341

N.V. : 60-280 mg/dl

The data of the remaining humoral compartments (C3 and C4) don't reveled any significant differences ($P < 0.212$ & $P < 0.716$) between patients and control group . In addition recent results showed that the C3 and C4 mean concentration of thalassemic patients (194.29 and 38.27) respectively was less than those of control group (224.62 and 41.15) respectively table (4 and 5)

Table (4) : Mean concentration of C3 in sera of thalassemic patients and control group .

Group	No.	Range	Mean	SD ±	S.E.
Patient	20	113.4-270.2	194.29	60.24	13.47
Control	10	113.4-276.2	224.62	63.52	20.10

N.V. : 91-156 mg/dl

Table (5) : Mean concentration of C4 in sera of thalassemic patients and control group .

Group	No.	Range	Mean	SD ±	S.E.
Patient	20	13.4-85.1	38.27	19.95	4.46
Control	10	4.8 -85.1	41.15	20.85	6.59

N.V. : 20-50 mg/dl

Discussion

Current investigations indicated that thalassemia patients had higher value of the serum IgG in comparing with control group with ahigh significant differences ($P < 0.01$). This may be due to repeated blood transfusion in thalassemic patients which may result in a continuous exposure to various antigens and will lead to increased serum IgG (Weatheland and Clegg , 2000) . This result identical with Amin *et al* .,2005 . It was also suggested that iron overload as an important contributing factor in altering immune parameters in thalassemia patients , it has been suggested that iron overload results in increased migration of T- helper cells to the gut and lymph nodes and this cause an increase in serum IgG values among thalassemic patients in this study (Chalevelakis *et al* ., 1975).

Levels of IgM and IgA didn't shaow any significant differences between thalassemic patiens and control group , moreover mean concentration of IgM and IgA in patients was lower than those in control group . The acceptable explanation that

there is an immunological defect observed in patients with thalassemia (which need to blood transfusion) which make theme susceptible to different kinds of infections (Kutakculer *et al* ., 1996) , and the multiple blood transfusion increased ferritin concentration which lead to immunossupressive effects (Li *et al* ., 1997) .

The increasing in IgG level and an uncreasing of IgM and IgA value in thalassemic patients may be due to that most infections which happened after blood transfusion in chronic stage not in acute stage of infection.

Recent data associated with IgM and IgA level were in agreement with those of Amin *et al* ., (2005) .Some authors showed an increasing of IgG levels and / or IgM (Fessas , 1963 and Model , 1977) but other studies documented normal concentrations of immunoglobuline levels in thalassemia major patients (Piomeli *et al* ., 1974 ; Propper , 1983 and Vergin *et al* ., 1997) . Moreover , Ezer *et al* ., (2002) documented that there was no significant differences in humoral immunity in thalassemic patients . Malasti *et al* ., (1997) confirm that circulating erythrocytes from thalassemic patients contained elevated amounts of IgG.

Serum levels of C3 and C4 were lower than controls and there is no significent differences between patients and control group . these reducing in C3 and C4 may be due to reduced in synthesis or increased consumption and this reduction also noticed by (Amin *et al.* , 2005).

Instead of the above Malasit *et al.* , 1995) referred to the occurrence of low number of C3 and C5b-9 complement complexes on erythrocytes of β – thalassemia patients , both C3 and C5b-9 could promote removal of diseased cells in reticuloendothelial cells which may explain the lowering concentration of C3 in sera of thalassemic patients in recent study .

Recent work identical with Corry *et al* ., (1981) and Sinniah & Yadav (1981) Like in recent work Vergin *et al* ., (1997) also reported no significant abnormalities in concentrations of serum IgM , IgA and C3.

As mentioned there was an alteration in serum immunoglobulines and complements levels in thalassemia major this probably can be due to marked heterogeneity of the patients in different studies . This heterogeneity concerns race , socioeconomic class , nutritional status and environmental factors (Amin *et al* ., 2005).

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