Bata thalassemia incidence in Baghdad city and the association with ABO blood groups

حدوث البيتا ثالاسيميا في مدينة بغداد وعلاقة ذلك بمجاميع الدم

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Abstract

B-thalassemia is one of the inherited disorders of hemoglobin synthesis which is caused by the reduction or absence of Bata globin chains of hemoglobin. A total of 236 cases of clinically β-thalassemia patients were collected from thalassemia centers in Baghdad city-Iraq. This study revealed that blood group O^+ was the most common group in β-thalassemic patients followed by blood groups B^+ and AB^+ whereas blood groups A^-, O^- and AB^- were the lowest in both males and females. Concerning the age incidence, the most common ages with β thalassemia was 11-18 years. HPLC analysis revealed an increased level in HbA2 (>3.5-5.5). Blood analysis showed decrease levels of MCV (64-70fl), MCH (23-27 pg) and Hb (6.3-6.8g/dl) whereas RBCs and serum ferritin exhibited increased levels (5.8-6.4 and 820-1240micro/l respectively). Platelets count was normal. In conclusion, β-thalassemia is more incident significantly (concerning the city of Baghdad) among patients with blood group O, age group 11-18 years, and in males more than females.

الخلاصة

تعتبر الثالاسيميا من نوع بيتا واحدة من الامراض الموروثة التي تسبب خلل في عملية تصنيع الهيموغلوبين الذي يؤدي الى نقص او غياب كامل لسلاسل بيتا غلوبين . تم اخذ ٢٣٦ حالة من البيتا ثالاسيميا في مركزين خاصة بالثالاسيميا في بغداد . اظهرت النتائج بان مجموعة O^+ هي الاكثر شيوعا من مجاميع الدم بين الاصابات ثم تليها مجموعة B^+ ثم AB^+ والاقل من ذالك هو مجاميع A^- و AB^- وO^-. وكانت اكثر الاعداد بين الاصابات هي بين الاعمار التي تتراوح بين ١١- ١٨ سنة . ان عملية التحليل الشامل للدم اظهر انخفاضا في حجم كريات الدم الحمر (٦٤- ٧٠ فمتوليتر) و بمعدل متوسط الهيموغلوبين (٢٣-٢٧ بيكوغرام) كذلك انخفاض في كمية الهيموغلوبين (٦,٧-٦,٨ غم/ديسيليتر) . واظهرت النتائج عن زيادة في عدد خلايا الدم الحمر والفيريتين (٥,٨-٦,٤ و٨٢٠-١٢٤٠ هايكروغرام/لتر بالتعاقب) . الاستنتاج يشير الي ان حدوث البيتا ثالاسيميا في مدينة بغداد يكون مرتفعا بشكل ملحوظ احصائيا ما بين المرضى لمجموعة الدم او, والاعمر ما بين ١١-١٨ سنة, ومابين الذكور مقارنة بالاناث.

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Introduction

Thalassemia is a Greek would which is an autosomal recessive inherited disease characterized by reduced synthesis of one or more of globin polypeptide chains of hemoglobin (Mustafa et al., 2020). Nor

mal adult Hb contains two α and two β globin chains. Alpha and β thalassemia result primarily from deletions or mutation in gene coding for α and β globin chains of hemoglobin respectively, resulting in decrease or absence production of respective globin chain. The altered globin chain production in thalassemia reduces the functional capacity of hemoglobin in individual with this condition. If left untreated sever forms of thalassemia would result in death during early childhood (Frzana and Kwiatkowski, 2015). Beta-thalassemia major is commonly caused by homozygous deletion of β-globin chain gene. It is clinically characterized by sever hemolytic anemia affects many organs and associated with high morbidity and mortality (Yang, *et al*., 2009). In Iraq, thalassemia regarded as one of the major health problem, which was first reported in 1964 and 1968 (Baker and Al-Quasi 1964, Taj-Eldin *et al*., 1968). Later, hhe prevalence of thalassemia in Baghdad city was reported as 35.7 per 100,000 (Mustafa et al., 2020). In Iraqi Kurdistan region prevalence of β-thalassemia obł served as deduced from premarital screening program in the three main cities in the region ranging from 3.7% to 6.9%

with higher figure coming from Erbil province while the lower come from Duhok (Al-Allawi and Al-Dousky 2010, Al-Allawi, 2008). In study about the prevalence of β-thalassemia among premarital couples in Sulaimani-Iraq, β-thalassemia minor was 4.14% and alpha-thalassemia was 3.3% (Jalal *et al*., 2008). In Basrah a ratio of 4.6% for β-thalassemia was recorded (Hassan, *et al*., 2003). In neighboring countries the prevalence of β-thalassemia trait is lower or higher when compared with Iraq including 3-3.5% in Jordan (Bashir *et al*., 1991), 2-3% in Lebanon (Charafeddine et al 2008) 5-10% in Iran (Karimi and Rasekhi, 2002) and 2.6-3.7% in Turkey (Yıldız *et al*., 2005). A relationship between ABO blood group system and certain diseases in human was well documented in many studies; blood group B is more susceptible to hypertension (Sadiq *et al*., 2017) whereas blood group A is more related to insulin resistance and blood group O is less directly related to insulin resistance (Aykas *et al*., 2017). In a study about the relationship between β-thalassemia among patients in Baghdad city and blood groups, blood group O was found as the highest ratio followed by blood group B whereas the lowest blood group in both genders was AB blood group (Marbut *et al*., 2018 and Hussein, 2021).

The aim of this study is to find out the incidence of β-thalassemia according to the age and gender and to investigate relationship between ABO blood groups system and

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β-thalassemia among people in Baghdad Iraq in order to put a proper strategy for prevention and control of this disease.

Material and Patients

The study was performed in Ibin–Albalady and Al-Karama thalassemia centers in the city of Baghdad during the period from November 2020 to March 2021. A total of 236 cases of β-thalassemia patients were participated in the study. Bata thalassemia was determined by using HPLC (Trinty Biotech Premier Resolution). The gender and age were registered. Analyses to blood parameters including ABO blood groups, MCV, Hb, MCH, RBCs, platelets and serum ferritin were carried out. HbA, HbA2 and HbF were also determined. Statistical analysis by SPS **Results**

A reduced mean corpuscular volume (MCV) of < 80 fl, MCH and HbA2 >3.5 were used as a screening test for determination of β-thalassemia. Other tests including Hb, RBCs, HbA and HbF were also carried out to confirm the diagnosis. This study showed that blood group O^+ was the most common blood group among thalassemic patients followed by B^+ blood group, whereas AB blood group was the lowest one as shown in table (1).

Table (1). Distribution of β-thalassemia patients according to ABO blood groups system.

Blood group n=236		№	Male		Female		Total according to gender			
							Male		Female	
			№	%	№	%	№	%	№	%
A n=66	A^+	57	32	56%	25	44%	37	56%	29	44%
	A^-	9	5	55.6%	4	44.4%				
B n=63	^+B	51	28	55%	23	45%	35	55.6%	28	44.4%
	B^-	12	7	58.3%	5	41.7%				
O n=82	^+O	70	40	57%	30	43%	48	58.5%	34	41.5%
	O^-	12	8	66.7%	4	33.3%				
AB n=25	AB^+	15	10	66.7%	5	33.3%	15	60%	10	40%
	AB^-	10	5	50%	5	50%				

**P value is significant between the highest incidence blood group (O) and the other blood groups.*

*** P value is only significant concerning the frequency between genders for the O^- and AB^+ blood groups on behalf the male gender.*

Table 2 shows the distribution of thalassemia patients according to age. The highest incidence of β-thalassemia was noticed among age group 11-18 years, whereas the lowest incidence was noticed among age group 25-above years with significant value.

Table (2). Distribution of β-thalassemia patients according to age.

Age	Total number	Percent
6-10	66	28%

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11-18	82	35%
19-24	63	27%
25-above	25	11%

**P-value is significant concerning the difference in β-thalassemia frequency according to patient's age*

Table 3 illustrates the blood parameters in thalassemic patients. There are increased levels above the normal values in RBCs, serum ferritin, HbA2 and HbF with a significant values, decreased level below normal values in MCV (not significant), MCH (not significant) and Hb (significant) with normal values for platelets.

Table (3). Blood parameters values in β-thalassemic patients.

Test	Result	Normal values	p-value
RBCS	5.8-6.4	Male: 4.7-6.1	<0.05 (S)
		Female: 4.2-5.4	<0.05 (S)
MCV	64-70fl	85-95fl	>0.05 (NS)
MCH	23-27 pg	25-27 pg	>0.05 (NS)
Hb	6.3-6.8	Male: 13.2-16.6	<0.05 (S)
		Female: 11.6-15	<0.05 (S)
Platelets	330^3-410^3 /µl	150^3-450^3 / µl	>0.05 (NS)
Serum ferritin	820-1240 µg/l	20 -250 µg/l	<0.001 (HS)
Hb A2	3.5- 5.6	2.5	<0.05 (S)
Hb F	5.6 7.1-	-0.4 0.3	<0.005 (HS)

S= significant, NS= not significant, HS= highly significant

Discussion

B-thalassemia is highly prevalent in the Mediterranean, Middle East countries, and Africa and represents a real health problem in many of these countries (Hussein, 2021). In Iraq thalassemia regard as one of the major health problem.

In the present study we found that the most common blood group observed in patients with β-thalassemia was O^+ followed by B^+ blood groups. The lowest was the A^-, B^-, and AB^-.

For both males and females the results were consistent with the studies carried out in Baghdad (Aykas et al., 2017 and Meatheral &, Clegg, 1999) and in Kirkuk (Mohssin et al., 2015). In India, it had been reported that β-thalassemia was more common O^+ (Grow et al., 2014).

This study found that β-thalassemia is less common in people with A^-, AB^- and O^- blood groups, a result consistent with other previous study in Baghdad (Aykas et al., 2017)

As it is demonstrated in table 2, β-thalassemia is more common in age 11- 18 years. Bata-thalassemia can occur in any age when the infants between 6and 24 months.

Table 3 illustrates the blood parameters in thalassemic patients. There are increased levels above the normal values in RBCs, serum ferritin HbA2 and HbF, decreased level below normal values in MCV, MCV and Hb with normal values for platelets. Similar results were reported in Iraq (Taj-Eldin *et al*., 1968, Abbas 2013, Al-Allawi, *et al*., 2006) and other

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countries (Sinha *et al*., 2017, Soliman *et al*., 2014, Jamel *et al*., 2017).

In conclusion, β-thalassemia is more incident significantly (concerning the city of Baghdad) among patients with blood group O, age group 11-18 years, and in males more than females.

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