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HEMATOLOGICAL STUDY OF SOME BLOOD PARAMETERS IN PATIENT WITH MAJOR β -THALASSEMIA

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ABSTRACT

β -Thalassemia is more an inherited anemia publicity that common in the world and especially in Mediterranean region, and the most important cause of mortality in patients with β -thalassemia. The present study carried out on (40) sample of males and females their age from (3-27) years with B- thalassemia in Hila ,there were (30) sample of them infected with B- thalassemia major , who consult the thalassemia center for Babylon children Hospital, while (10) healthy used as a control group. The results present study showed that a significant decrease ($p < 0.05$) in number of red blood cells and the concentration of hemoglobin and packed cell volume (PCV) and the values of the mean corpuscular volume (MCV) and the number of blood platelets in the blood of infected with β - thalassemia major compared with healthy, while the results showed a significant increase ($P < 0.05$) in the total number of white blood cells in children infected with the disease compared with the control group, as the current research distinct that the ratio of males infected with β - thalassemia (66%) and the ratio of females (44%), also blood group (A) were the most susceptible to the infection with β -thalassemia (38 %) compared with the other blood groups, as the infected who carry the factor rhesus positive (Rh+) were (65%) higher than the patients with rhesus factor negative (Rh-) were (35 %).

Keywords: β -Thalassemia; PCV; MCV.

Introduction

Thalassemia is the most important diseases of hemolytic anemia, and it is a Greek word originally that means Mediterranean anemia, this disease was known and resounded in this region significantly so-called anemia Mediterranean and was diagnosed and known their kinds by scientists Lee and Cooley in 1925, so it was called as Cooley's anemia in the United States (Olivieri, 1999). Thalassemia is a genetic disorder in biosynthesis in the globin chains of normal hemoglobin because genetic mutations in the genes that responsible for the globin chains production Alpha and Beta (Cortran *et al.*, 1999). The alpha-globin chains were encoded by four genes located on chromosome 16 while beta-globin chains located on chromosome 11 (Schechter, 2008). mutation happend in one of the globin chains (beta or alpha) or both, therefore, thalassemia are classified depending on the type of affected globin chain to the Alpha and Beta thalassemia also each type is divided by the number of genetic mutations in globin chains to secondary varieties, beta-thalassemia is more frequent and widespread to few of controlling genes (Waye *et al.*, 2014). The types of thalassemia (alpha and beta) which undergo all genes to amutations are the species most dangerous to a patient's life (Kutlar, 1992). Alpha-thalassemia major causes hydropsfetalis of the embryo and his death before he was born, either beta-thalassemia major causes severe anemia, life threatening and the patients need to blood transfusion periodicity each(3-4) weeks according to age and lack degree of hemoglobin (Antonia and Renzo, 2010). As a result of the in ability of the body to form normal

red blood cells, but the red blood cells are abnormal and small-sized and full of inclusion bodies that make up the result of the accumulation of alpha and beta chains inside the corpuscular making hemoglobin insoluble and this slushy abnormal condition which the hemoglobin is dissolved in corpuscular (Yahya *et al.*, 1996). Beta-thalassemia major may detect during the first months six from the child's age, and the disease leads to a number of complications if not treated as yellowing of the skin (jaundice) and enlargement of the liver and spleen and growth retardation in addition to malformations in the bones of the face and diabetic and disease of the heart muscle (Ponticelli *et al.*, 2010).

Material and Method

Patients

This study included (30) patients, (male and female) with B-thalassemia major follow up and treated at thalassemia center of the Babylon children Hospital, these patients and then the results that obtained compared with the control group that included (10) healthy (control group).

The collection of information

Information was collected by preparing special menus recorded the necessary information and special of the research samples have included the:

- 1- Age.
- 2- Sex.
- 3- Blood group.
- 4- Rheuses factor(Rh)

The collection of blood samples.

Blood samples were collected between the hours of nine and ten in the morning using medical disposable syringes and needles where used for blood collection. Then the samples placed in a tubes container the material anti- coagulation (EDTA), to do blood tests included in this study.

Measurement: After collected the blood samples and placed in a tubes container the material anti- coagulation (EDTA) to measure (30 samples patient with beta Thalassemia) by the CBC Full Blood Analysis Hematology Diagon D-Cell 60 in the Babylon children Hospital to measure the parameter of the blood.

Results and Discussion

Effect β - thalassemia major on number of the red blood cells, concentration of haemoglobin, packedcell volume (PCV) and mean corpuscular volume (MCV).

The results showed a significantdecrease ($p < 0.05$) in the number of the red blood cells and concentration of haemoglobin and packed cell volume and mean corpuscular volume in patient with β -thalassemia major (3.61 ± 0.52 , 6.97 ± 1.99 , 22.60 ± 5.44 , 69.31 ± 2.39) respectively compared

with the controlgroup (5.68 ± 1.40 , 12.76 ± 0.78 , 44.40 ± 3.16 , 81.94 ± 6.51) respectively Table (4.1). Effect β - thalassemia major on the total number of white blood cells and number of the blood platelets. Table(4.2) showed that a significant increase ($p < 0.05$) on the total number of white blood cells in blood of patients with β -thalassemia (15.68 ± 1.08) and showed a significant decrease ($p < 0.05$) in the number of the blood platelets in patient children with β -thalassemia major (197 ± 62.76) compared withthe control group (10.01 ± 0.79 , 265 ± 157.75 respectively). The correlation between the sex, blood group and Rhesus factor(Rh) and β -thalassemia major. The results of present study revealed that the ratio of patient males with β -thalassemia major (66%) was higher than the ratio of patient females (44%) (figure 4.1), while the figure(4.2) illuminates that the patient with β -thalassemia major from blood group A (38%) more infection with the disease, then patient with blood group O (24%), then patient children with blood group B (20%) and last patients with blood group AB (12%). as the infected who carry the factor rhesus positive (Rh+) were (65%) higher than the patients with rhesus factor negative (Rh-) (35%) (figure 4.3). As the interference between the blood group and Rhesus factor (Rh).

Table 1 : Effect of B-thalassemia major on number of the Red blood cells, concentration of hemoglobin, packed cell volume (pcv) and mean corpuscular volume (MCV):

Mean Corpuscular volume fl (MCV)	Packed cells volume (%) (PCV)	Concentration of hemoglobin mg/dL	Number of red blood cells Million /mm ³	Samples
Mean±SD	Mean±SD	Mean±SD	Mean±SD	
81.94 ± 6.51	44.40± 3.16	12.76± 0.78	5.68 ± 1.40	Control group
69.31 ± 2.39	22.60± 5.44	6.97± 1.99	3.61± 0.52	Patients
P value <0.05	Pvalue<0.05	P value<0.05	Pvalue<0.05	Probable level

*P value <0.05 was Significant

Table 2 : Effect of β - thalassemia major on the total number of white blood cells and number of the blood platelets.

Total number of white blood cells mm ³	Number of the blood platelets.	Samples
Mean±SD	Mean±SD	
10.01 ± 0.79	265±157.75	Control group
15.68 ± 1.08	197.50 ± 62.76	Patients
P value <0.05	P value <0.05	Probable level

*P value < 0.05 was Significant

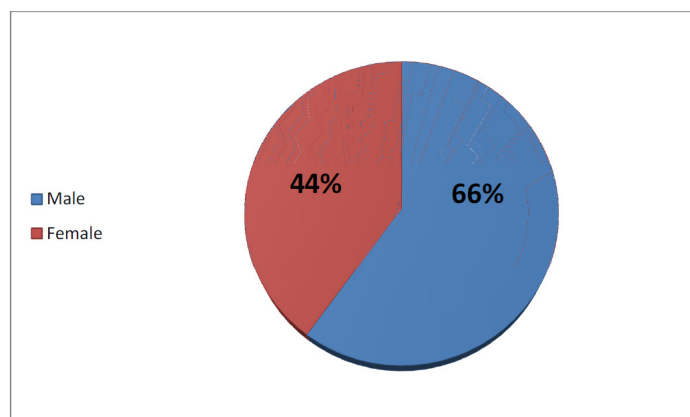


Fig. 1 : Relation ship between β -thalassemia major and the sex

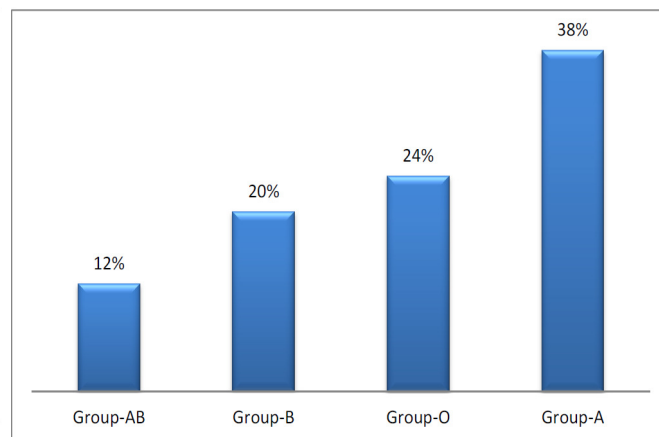


Fig. 2 : Relationship between β -thalassemia major and the blood group

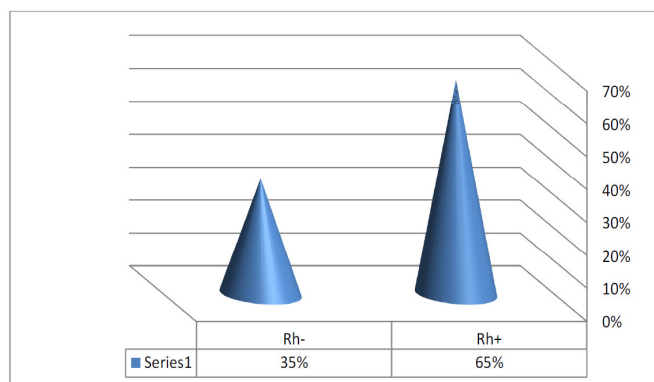


Fig. 3 : Relationship between β -thalassemia major and the Rh

Discussion

Effect β -thalassemia major on number of the red blood cells, concentration of haemoglobin, packed cell volume (PCV) and mean corpuscular volume (MCV). The results showed a significant decrease in the number of red blood cells in with β -thalassemia major when compare with the control group (Table 1).

The cause returns to the genetic mutations that occur in the genes responsible for the synthesis of protein chains in hemoglobin which lead to disorder in the biosynthesis of the globins chain and thus loss the imbalance in the manufacture of hemoglobin (Aulakh *et al.*, 2009) and this affects in the number and shape and size of red blood cells during the formation stages in the bone marrow, where red blood cells are small size and therefore red blood cells do not hold the same volume occupied by normal red blood cells (Weatherall, 2001), as lack the correlation of globin chains by wall membrane red cell lead to collect globin chains inside the red cell and formation the inclusion bodies that are prone to phagocytosis by macrophages that exist numerously in bone marrow and remove the red blood cells during development stages and the red blood cells that enter into the circulatory system may be broken yours truly or broken inside the spleen by macrophages that riddance the blood from the malformed and aged (Malik *et al.*, 2009).

The result of this study are consistent with the results of several studies (Shanthi *et al.*, 2013). Either decrease in hemoglobin concentration was due to a genetic defect in synthesis globin chains leading to the lack or low production globin chains (α , β) in hemoglobin (Bennett and Plum, 1996) and this leads to the production of a small number of red blood cells that are small in size and hypochromic (Olivieri *et*

al., 2011) as well as broken large number of red blood cells due to a significant decrease in hemoglobin concentration .and this result agreed with the results of many studies (Jalal and Mbchb, 2010).

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