RESEARCH ARTICLE

Study the Effectiveness of (G-6-PhD) Enzyme and the Level of Fats in Peoples with Leukemia

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ABSTRACT

A chemo-enzymatic study of the enzyme G-6-PhD in the blood of people with leukemia and lipid level estimation and blood tests for cancer patients in the Kirkuk city. It included 80 samples, 30 of them are healthy as a control group and 50 patients with leukemia, which was collected from the center of cancer tumors in Kirkuk and the ages (1–60) years old. During this study was evaluated the level of effectiveness of G-6-PhD from red blood cells by using the diagnostic kit (BioLaBo). There is a decrease in the level of G-6-PhD enzyme effectiveness, especially in the second age group where there was a clear decrease in this category compared to healthy people. In addition, serum lipid levels were measured for people with leukemia, where they found a decrease in fat levels high-density lipoproteins (HDL), CHOL and an increase of very low-density lipoproteins (VLDL), low-density lipoproteins (LDL), TG. Also, some blood tests were conducted in people with leukemia. There was a decrease in the level of (HB, PLT, PCV) and increase at the level of both (WBC) compared to healthy.

Keywords: Cholesterol, Glucose-6-phosphate dehydrogenase (G-6-PhD), Hb, High-density lipoproteins, Low-density lipoproteins, PLT, PCV, Triglycerides, Very low-density lipoproteins.

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INTRODUCTION

Leukemia is a type of cancer of the blood cells and tissues that produce blood cells such as the bone marrow where the bone marrow begins to produce many abnormal white blood cells that enter the bloodstream and begin to compete with normal blood cells and prevent them from doing functions properly.[1] There are two types of leukemia (Myeloid leukemia) (lymphoid leukemia), and these are divided into four types (CLL– CML – AML – ALL).[2] The effectiveness of the enzyme (G-6-PhD) and then discovered in the human in the middle of the twentieth century (1926).[3] It is one of the enzymes of oxidation and reduction and has the formal name (EC 1.1.1.1 49), the main enzyme in the path of five-sugars so the decrease of this enzyme causes exclusion (NADPH) in red blood cells.[4] The fat consists of (5%) of the organic substances involved in the composition of the living cell and there is about (40–50) type of these molecules living in the cell and brain cells and nerve cells are the richest body organs complex fat compounds and estimated the energy produced by fat burning twice the energy produced from The same amount of carbohydrates and protein.[5]

MATERIALS AND METHODS

The study was done on (80) sample had Leukemia, (50) patients diagnosed with leukemia and (30) controls were also involved in the study, the sample of blood and serum were collected by specialized doctors. All were informed regarding the study, and written consent was obtained. General information such as name, age, gender, acute illness, height, weight, and drugs usage, etc. was recorded in case of history performa. Blood samples were collected in a gel and anticoagulant tubes from normal, and leukemia infected patients. The biochemical test included each of G-6-PhD activity was measured from Biolabo kit while cholesterol, triglyceride, and HDL measured using the standard kit from Biolabo while LDL and VLDL was measured .

Methods

- Glucose-6-Phosphate Dehydrogenase activity (G-6-PhD) was estimated using U.V kinetic method.[6]
- Cholesterol was estimated using Richmond method.[7]
- Triglyceride was estimated using Automated reaction.[8]
- Hight density lipoprotein was estimated using D¸ Labbe al Bic Clin method.[9]
- White blood cell was estimated using Turkeys fluid manual method.[10]

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- Hemoglubin was estimated using cyano methemoghobin manual method.[11, 12]
- Pocked cell volume was estimated using the Micro hematocrit centrifuge manual method.[13, 14]
- Pletleat was estimated using Complet Blood account.[15]

STATISTICAL ANALYSIS

In this study, the results include mean ± S.D and significant differences (P.Value) between groups that examined an available statical SPSS 17.0 significant differences was estimated as the p.value equal to or less than 0.0

RESULTS AND DISCUSSION

Effectiveness of the enzyme (G-6-PhD) in the blood of people with leukemia and its comparison with healthy people

The results are shown in Table 1 and Figure 1 show that the level of efficacy of the enzyme (G-6-PhD) has decreased significantly at the level of probability ($p<0.001$) for all age groups in the blood of people with leukemia compared to the healthy group. These results are consistent with previous research where it indicated low levels in serum blood cancer patients as well as in patients with hemolytic anemia.[16] When comparing the effectiveness of the enzyme (G-6-PhD) in the blood of patients with leukemia, note that the effectiveness of the enzyme in the age group < 15 years and 31-45 at the level of probability ($p<0.001$) because the enzyme stimulates the first interaction of the pathway pentose and provides red blood cells with NADPH Which is necessary for the management of oxidative stress in the presence of agents or an infection.[17] And also note that when comparing the effectiveness of the enzyme (G-6-PhD) in the blood of patients with leukemia, notice a significant decrease in the probability of ($p<0.001$) of the efficacy of G-6-PhD enzyme in the second and fourth age group (16–30) years old and (46–60) years old. The reason is due to the role of some hormones that affect the decrease and also a rapid breakup of red blood cells in the age group (16-30) years old and this rapid break-up associated with anemia and lead to the decline.[18]

Cholesterol

The results showed that the level of cholesterol was significantly decreased at the probability level ($p<0.001$) of all age groups in the blood serum of people with leukemia compared to the healthy group. These results are consistent with previous research indicating signs of low blood serum levels of cancer patients As well as acute lymphocytic leukemia.[19, 20] And the highest rate of decline in the last age for this decline in the level of cholesterol to increase the severity of the disease in older people as well as high levels of antioxidants and their products with age and increase the case of oxidative stress and thus increase fat peroxidation.[21,22]

Triglyceride

The results in Table 2 showed a significant increase in level ($p<0.001$) in the levels of triglycerides in the serum of the group of patients compared with healthy patients. These results are consistent with the results of previous research, indicating the high levels of triglycerides in serum patients leukemia and

Table 1: Effectiveness of the enzyme (G-6-PhD) in the blood of people with leukemia and its comparison with healthy people

Age		*Activity of G-6-PhD (µmol/L/min) (S.D ± mean)*
< 15	Control (8)	(123.8 ± 12.4)
	Patients (12)	(**113.22 ± 26.7)
16-30	Control (8)	89.87 ± 17.3))
	Patients (12)	**38.45 ± 14.9))
31-45	Control (7)	144.65 ± 22.9))
	Patients (13)	**56.11 ± 11.25))
46-60	Control (7)	132.6 ± 13.8))
	Patients (13)	**44.25 ± 9.3))

** significant difference at ($p\leq 0.001$)

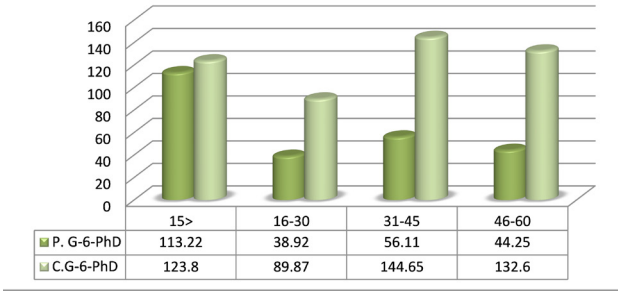

Figure 1: Effectiveness of the enzyme (G-6-PhD) in the blood of people with leukemia and its comparison with healthy people

Table 2: Levels of selected fats (CHO, T.G, HDL) in the serum of people with leukemia and comparison with healthy people

Age		*CHO (mg/dL)*	*T.G (mg/dL)* S.D ± Mean))	*HDL (mg/dL)*
< 15	Control (8)	1.2 ± 190.1))	±139.8) 2.9)	3.2 ± 45.5))
	Patients (20)	(** 6.9 ± 123.6)	**4.91 ± 170.5))	(**1.92 ± 30.5)
16-30	Control (10)	3.2 ± 189.4))	± 138) (3	4 ± 47.1))
	Patients (11)	**5.4 ± 120.5))	(**8.8 ± 181.4)	**3 ± 28.9))
31-45	Control (7)	(2.3 ± 183.1)	3 ± 140))	± 44.4) 3.7)
	Patients (14)	(**11.15 ± 122.4)	(**12 ± 208.1)	± 28.1) (**0.99
46-60	Control (11)	(2.9 ±190.1)	3 ± 140.8))	2.99 ± 44.9))
	Patients (31)	(**5.2 ± 79.1)	(**33.1 ± 240.1)	**1.2 ± 8))

** significant difference at ($p\leq 0.001$)

all age groups. It is also noted that there is a rise in levels with age. This is consistent with previous studies of researchers,[23, 24] and recorded the highest rate of increase in the last age (46–60) year old, the cause of its severity and the aggravation of the disease to increase the age.[25] The high levels of triglycerides may be due to Overflowed the effectiveness of (lipoprotein lipase) enzyme for an entrepreneur triglycerides analysis and thus increasing its level.[26]

A 4- Level of high-density lipoproteins in blood vessels with leukemia

The results shown in Table 2 show that the level of HDL has decreased spontaneously at the probability level ($p < 0.001$) for all age groups in the serum of people with leukemia and both sexes compared with the healthy group. There is a decrease in HDL levels of people with leukemia and with age. These results are consistent with.[24] and have the highest rate of increase in the last age group (46-60) years old and the cause of the severity and aggravation of the disease by increasing age.[25] and that the cause of low levels of (HDL) may be due to the vital use of (HDL) by cancer cells in the process of building and multiplying cancer cells in the body[27] Or maybe due to the low efficacy of the enzyme (lipoprotein lipase) which is responsible for the analysis of triglycerides to fatty acids and glycerol and therefore the degradation of molecules (V-LDL), which lead to the depletion of HDL molecules by blocking the transfer of all lipid and (Apo protein) from (lipoprotein) which is rich in tripartite triglycerides to HDL and also inhibit the exchange between ester and colicetrol in HDL and TG in VLDL.[28]

Level of low-density lipoproteins in blood vessels with leukemia

The results indicated in table 3 showed a significant increase in the level of ($p < 0.001$) in the levels of (LDL) in total serum patients compared to healthy, And that these results are consistent with the results of previous research indicated the high level (LDL) in serum blood of cancer patients and both genders and for all age groups.[28]In this case, the reason may be due to the decrease of HDL, and the increase in the level of LDL and the oxidation rate is due to the increase in the quantities of free radicals, and that leads to decrease the levels of HDL and increased levels of LDL.[29]

The level of very-low-density lipoproteins in blood vessels with leukemia

The results are shown in Table 3 at level (VLDL-C) were significantly increased at ($p<0.001$) level in the serum group of patients with leukemia compared to healthy for both sexes and all age groups. The reason for the high low density lipoprotein on a large amount of triglycerides, which is formed in the liver by the liver cells cortical, which works to transfer TG and cholesterol to the rest of the body.[29] and the process of oxidation in the body contribute to the high level of (VLDL), which leads to a reduction in the level of effectiveness of the enzyme Lipoprotein lipase located in the tissues of the body and this decrease leads to malfunction In the level of fat and a rise in the level of triglyceride in the serum where the ratio of glycerides in VLDL is increasing therefore can be explained by the rise of TG in VLDL mechanism of the same height TG.[30]

Table 3: Levels of selected fats (LDL, VLDL) in the serum of people with leukemia and comparison with healthy people

Age		*LDL (mg/dl) S.D ± Mean))*	*V-LDL (mg/dl)*
< 15	Control (8)	(3.92±118.1)	(0.9±26.9)
	Patients (20)	(**6.1± 62.5)	**1.25±35.1))
16-30	Control (10)	4.3±120.4))	1.1±27))
	Patients (11)	**7.1±60.4))	**1.3 ± 38))
31-45	Control (7)	(8.1 ± 118.2)	±27.5) 0.5)
	Patients (14)	**9.9 ± 57.1))	**2.9 ± 44.1))
46-60	Control (11)	(15.9 ± 122.1)	0.81 ± 27.9))
	Patients (31)	(**9.5 ± 24.1)	**8.1 ± 48.91))

** significant difference at ($p \leq 0.001$)

Table 4: Levels of Study of some blood tests (concentration of hemoglobin, total red blood cells, the total number of white blood cells and platelet count) in the blood of healthy and leukemia patients

	Age	*Hb (g/dL)*	*Pcv %*	*WBC *10 9/L*	*Plt (mg/dL) S.D ± Mean))*
< 15	Control (8)	1.01 ± 11.8))	±36.1) 40.6)	±5.1) 0.2)	2.87 ± 155.2))
	Patients (20)	**2.5 ± 10.4))	**7.2 ± 31))	(**1.6 ± 13.9)	(**2.1 ± 62.1)
16-30	Control (10)	1.1 ± 11.7))	1.2 ± 35.8) (	± 5.21) 0.4)	3.4 ± 150.1))
	Patients (11)	**2.91 ± 9.2))	(**9.1 ± 27.3)	(**1.4 ± 12.9)	**4.49 ± 59.2))
31-45	Control (7)	(0.19 ± 11.5)	0.9 ± 36.2))	± 5.5) 0.33)	2.7 ± 151.1))
	Patients (14)	(**2.61 ± 10.2)	(**9.4 ± 28.4)	(**2.9 ± 14.3)	±73.1) 28 . (**
46-60	Control (11)	(0.2 ± 11.6)	0.71 ± 35.7))	± 5.2) 0.25)	2.4 ± 155.2))
	Patients (31)	(**2.4 ± 9.1)	(**6.79 ± 26.2)	(**3.6 ± 14.4)	**23 ± 3.81))

** significant difference at ($p \leq 0.001$)

Study of some blood tests (concentration of hemoglobin, total red blood cells, the total number of white blood cells and platelet count) in the blood of healthy and leukemia patients

The results shown in the table showed a significant decrease in the level of probability ($p < 0.001$) of hemoglobin HB concentration and the size of the red blood cells PCV of people with leukemia. The reason for the lack of red blood cells is due to the continuous crash and the transformation of large amounts of hemoglobin to meth globin (Meth - HB). Because of the lack of sufficient quantities of (reduced clotathione), which protects the iron Fe+2 from the transformation into Fe+3. Newly produced red blood cells are smaller and contain a small amount of hemoglobin to compensate for the shortage of red blood cells.[32] And this shortage of red blood cells leads to a dilution of blood fluid, which is the main cause of PCV decline and because it depends on the ratio of the plasma to the size of the sample cells.[33] The results shown in Table 4 showed a significant increase in the level of probability ($p < 0.001$) in the number of white blood cells in people with leukemia compared with healthy patients. The cause of an increase in white blood cells is due to the introduction of toxic substances and microorganisms into the body due to inflammatory diseases. Because white blood cells form the first line of defense on which the body relies on the invasion of microbes and toxins that are exposed to the body.[34] Also as shown in Table 4, a significant decrease in the level of probability ($p < 0.001$) for the platelet count in people with leukemia with compared to healthy, leads to appear blue spots on the surface of the skin is similar to bruises. These bruises are obvious because the number of platelets recorded less this reason to be the bruises are very clear. Besides these spots, there are dots of hemorrhagic size and may get internal bleeding anywhere in the body and hemorrhage what happens inside the eye Or brain.[35]

CONCLUSIONS

An investigated of Leukemia case was successfully performed, studying it's the effect on the Glucose-6-phosphate dehydeogenase activity G-6-PhD. The main concluded points from this research were summarized as follow: the decrease of Glucose-6-phosphate dehydeogenase activity level, CHOL, HDL, Hb, PCV, PLT ; increasing the level of T.G, LDL, V-LDL, WBC .

RECOMMENDATIONS

- The possibility of using the enzymes Glucose-6-phosphate dehydeogenase as biochemical parameters to follow the severity of the disease.
- Isolation of Glucose-6-phosphate dehydeogenase enzymes patients with leukemia

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