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Effect of Diabetic Ketoacidosis on Some Biochemical and Immunological Variables

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ABSTRACT

Background: This study included people who suffer from high percentage of diabetic ketoacidosis, where the tests were conducted on three groups of people with diabetes type 1 and patients with diabetes type II and the last group was control. Biochemical and immunological tests were performed and compared to control.
Material and methods: Samples were collected from patients who had a high level of diabetic ketoacidosis and were divided into 20 patients with type 1 diabetes, 20 patients with diabetes type 2 and 20 samples that were healthy for control. Biochemical tests included RBS, HBA1c, GOT, GPT, folic acid.
Result and discussion: the percentage of RBS and HBA1c in patients suffering from high ketoacidosis, where the highest percentage of RBS and HBA1c in the blood was recorded in patients with diabetes type I, reaching 445 and 11.7, compared to the rates of RBS and HBA1c in patients with diabetes type II, which reached 216, 8, respectively, and compared to control, where the ratios were 83 and 8, respectively.

Keywords: Diabetic Ketoacidosis, biochemical, immunological variables

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INTRODUTION

Diabetic ketoacidosis is an acute clinical symptom of absolute insulin deficiency. So, this symptom characterizes patients with type 1 diabetes, (Diabetes mellitus type 1), in which the cells of the pancreas that produce insulin (Langerhans' islets) are destroyed. However, you can also see this phenomenon in patients who have had type 2 diabetes (Diabetes mellitus type 2) for many years, as there is a decrease in the action of insulin-secreted cells over the years.[1,2,3] In the body, when insulin is insulin, several processes occurred at the same time, sugar does not enter muscle cells or fat cells. When cells lack fuel, the building blocks of new muscle and fat cells stop, and even a process of destruction of these cells begins. As a result, amino acids and fatty acids are released into the bloodstream simultaneously, and at the same time, in insulin deficiency, sugar reserves - known as glycogen - dissolve in the liver and more sugar is released into the bloodstream. Amino acids and fatty acids released from muscles and fats are absorbed in the liver, since in the absence of insulin, they convert them into acids called ketone bodies.[4,5,6] The sharp increase in blood sugar (hyperglycemia) resulting from these processes causes water to be excreted from the body's cells and excreted through the kidneys into the urine. As this process continues, dehydration develops. With the accumulation of acidic ketone bodies, the blood becomes more acidic, so that with time the person suffering from this phenomenon becomes sweeter, drier and more acidic. This situation, from the presence of ketoacidosis, if left untreated, could put the patient's life at risk. Symptoms accompanying this clinical condition are characterized by polyuria, signs of dehydration, nausea (nausea), vomiting, abdominal pain, lethargy and a lack of consciousness. With the build-up of ketones, the patient's mouth smells of acetone, indicative of the presence of acidosis. [7,8,9] Diabetic ketoacidosis may be the first symptom of type 1 diabetes, or it may indicate insufficient insulin secretion in patients with type 1 diabetes under various stress states. In these situations, such as severe infection (Infection) or acute psychological stress, the body's need for insulin increases greatly. Diabetic acidosis is a medical emergency and requires immediate treatment by trained staff. [10,11,12]

METHODOLOGY

Sample collection

Samples were collected from patients who had a high level of diabetic ketoacidosis and were divided into 20 patients with type 1 diabetes, 20 patients with diabetes type 2 and 20 samples that were healthy for control.

Biochemical analysis

Biochemical tests included RBS, HBA1c, GOT, GPT, folic acid. [13,14,15]

Immunological analysis

Immunological tests included Interleukin 2. [16,17]

RESULT AND DISCUSSION

Table 1. The percentage of RBS and HBA1c for patients suffering from high diabetic ketoacidosis in type 1 and type 2 diabetic patients

Descriptive Statistics				
Dependent Variable: concentration				
type 1 and type 2	RBS and HBA1c	Mean	Std. Deviation	N
diabetic type 1	Random blood sugar	445.00	70.277	10
	HBA1c	11.70	1.494	10

	Total	228.35	227.482	20
diabetic type 2	Random blood sugar	216.00	23.664	10
	HBA1c	8.30	.675	10
	Total	112.15	107.786	20
control	Random blood sugar	83.00	7.242	10
	HBA1c	3.50	.527	10
	Total	43.25	41.088	20
Total	Random blood sugar	248.00	157.627	30
	HBA1c	7.83	3.553	30
	Total	127.92	163.961	60

The term young diabetes is the old name for type 1 diabetes. As it was common in the past, the name insulin-related diabetes is used for young diabetes, because diabetes treatment is done through an external supply of insulin to the body. Youthful diabetes is a chronic disease that usually arises in childhood or adolescence, but it can appear in any generation as well. Young diabetics constitute less than 10% of all diabetic patients. The table (1) shows the percentage of RBS and HBA1c in patients suffering from high ketoacidosis, where the highest percentage of RBS and HBA1c in the blood was recorded in patients with diabetes type I, reaching 445 and 11.7, compared to the rates of RBS and HBA1c in patients with diabetes type II, which reached 216, 8, respectively, and compared to control, where the ratios were 83 and 8, respectively

Table 2. ANOVA table of the percentage of sugar and cumulative sugar for patients suffering from high diabetic ketoacidosis in type 1 and type 2 diabetic patients

Tests of Between-Subjects Effects					
Dependent Variable: concentration					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1536119.883[a]	5	307223.977	331.877	.000
Intercept	981760.417	1	981760.417	1060.541	.000
diabetic	350077.733	2	175038.867	189.085	.000
test	865200.417	1	865200.417	934.628	.000
diabetic * test	320841.733	2	160420.867	173.294	.000
Error	49988.700	54	925.717		
Total	2567869.000	60			
Corrected Total	1586108.583	59			
a. R Squared = .968 (Adjusted R Squared = .966)					

Table 2 Table of variance analysis of RBS and HBA1c levels for patients suffering from high diabetic ketoacidosis, as there were significant differences in RBS and HBA1c levels for patients with diabetes type 1 compared to diabetics type 2 and there are also significant differences with healthy people control .

Table 3. The percentage of interleukin 2 and folic acid for patients suffering from high diabetic ketoacidosis in type 1 and type 2 diabetic patients

Descriptive Statistics				
Dependent Variable: concentration				
type 1 and type 2	test	Mean	Std. Deviation	N
diabetic type 1	interlukin 2	852.00	68.605	10
	folic acid	12.60	1.265	10
	Total	432.30	433.185	20
diabetic type 2	interlukin 2	591.00	77.953	10
	folic acid	12.20	.632	10
	Total	301.60	301.727	20
control	interlukin 2	134.00	29.889	10
	folic acid	50.30	66.763	10
	Total	92.15	66.167	20
Total	interlukin 2	525.67	307.758	30
	folic acid	25.03	41.403	30
	Total	275.35	333.343	60

One of the first types of cytokines to be described, cytokines are defined as a group of substances (proteins, glycoproteins and peptides) that are secreted from cells of the immune system to carry signals between cells and have an effect on other types of cells. The initial identification of the first type of interleukin was that it was one of the factors that stimulate the rise in temperature, control the lymphocytes, increase the number of immune cells produced by the bone marrow and cause the destruction of the joints of the bones. Interleukin I take

two separate forms, alpha and beta, and both are secreted in a way that precedes inflammation as a form of effective immune system defense. They are secreted from macrophages, monocytes and fibroblasts. As these types raise the concentration of adhesion factors on the endothelial cells, which helps in the migration of the white blood cells that attack the pathogenic bodies to the site of infection and stimulates the thermoregulatory centers in the hypothalamus, which leads to an increase in the body temperature "fever". High body temperature helps the immune system fight infection. Table 3 shows the ratio of interleukin-2 and the percentage of folic acid in people with high ketosis in patients with type 1 and type 2 diabetes. 852 and 12.6 compared to control 134 and 50, meaning there were significant differences between the transactions.

Table 4. ANOVA table of percentage of interleukin 2 and folic acid for patients suffering from high diabetic ketoacidosis in type 1 and type 2 diabetic patients

Tests of Between-Subjects Effects					
Dependent Variable: concentration					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6410729.550[a]	5	1282145.910	476.752	.000
Intercept	4549057.350	1	4549057.350	1691.517	.000
diabetic	1177692.100	2	588846.050	218.956	.000
test	3759506.017	1	3759506.017	1397.931	.000
diabetic * test	1473531.433	2	736765.717	273.958	.000
Error	145224.100	54	2689.335		
Total	11105011.000	60			
Corrected Total	6555953.650	59			
a. R Squared = .978 (Adjusted R Squared = .976)					

Table 4 shows an analysis of variance of interleukin and folic acid ratios for patients with elevated ketoacidosis in type 1 and type 2 diabetes patients that there are no significant differences between the treatments and there are significant differences between patients with diabetes and control. Diabetes compared to control.

Table 5. The percentage of GOT and GPT for patients suffering from high diabetic ketoacidosis in type 1 and type 2 diabetic patients

Descriptive Statistics				
Dependent Variable: concentration				
type 1 and type 2	liver function	Mean	Std. Deviation	N
diabetic type 1	GOT	85.10	8.711	10
	GPT	81.90	9.303	10
	Total	83.50	8.924	20
diabetic type 2	GOT	82.00	7.645	10
	GPT	78.70	6.343	10
	Total	80.35	7.043	20
control	GOT	37.40	9.276	10
	GPT	28.60	7.691	10
	Total	33.00	9.442	20
Total	GOT	68.17	23.657	30
	GPT	63.07	25.960	30
	Total	65.62	24.758	60

The enzyme alanine transaminase (ALT), or serum glutamic pyruvic transaminase (in English: Serum glutamic pyruvic transaminase) and for short (GPT), is the type that is most often found in liver and kidney cells, and it is also found In the heart and muscles, but in much smaller quantities, and its function is to convert alanine; It is an amino acid found in proteins, to pyruvate. This enzyme is an important mediator in the production of cellular energy, and in general this enzyme is present in the blood in small quantities usually in healthy people. oxaloacetic transaminase (GOT), a type of enzyme found in the liver, red blood cells, heart, pancreas, kidneys, and muscle tissue. This enzyme is usually found in small amounts in the blood. As the normal values range from 10 to 40 units per liter. Table 5 shows the percentage of liver enzymes GOT and GPT for people with high ketoacidosis in type 1 and type 2 diabetes patients, where it was observed that there was an increase in the percentage of liver enzymes GOT and GPT compared to the control, where their percentage reached 85.81, respectively, compared to the non-infected control 37 28 in a row.

Table 6. ANOVA table of percentage of GOT and GPT for patients suffering from high diabetic ketoacidosis in type 1 and type 2 diabetic patients

Tests of Between-Subjects Effects					
Dependent Variable: concentration					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32507.483[a]	5	6501.497	96.010	.000
Intercept	258332.817	1	258332.817	3814.907	.000
diabetic	32014.633	2	16007.317	236.387	.000
test	390.150	1	390.150	5.762	.020
diabetic * test	102.700	2	51.350	.758	.473
Error	3656.700	54	67.717		
Total	294497.000	60			
Corrected Total	36164.183	59			
a. R Squared = .899 (Adjusted R Squared = .890)					

Table 6 shows the table of analysis of variance for patients for the ratios of liver enzymes GOT, GPT in patients with high diabetic ketoacidosis. It was noted that there were no significant differences between the treatments and there were significant differences between the treatments and the control.

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