مجلة التربوي
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معامل التأثير العربي 1.63
العدد 23

مجلة التربوي

مجلة علمية محكمة تصدر عن كلية التربية

جامعة المرقب

العدد الثالث والعشرون
يوليو 2023م

- المجلة ترحب بما يرد عليها من أبحاث وعلى استعداد لنشرها بعد التحكيم .
- المجلة تحترم كل الاحترام آراء المحكمين وتعمل بمقتضاها .
- كافة الآراء والأفكار المنشورة تعبر عن آراء أصحابها ولا تتحمل المجلة تبعاتها .
- يتحمل الباحث مسؤولية الأمانة العلمية وهو المسؤول عما ينشر له .
- البحوث المقدمة للنشر لا ترد لأصحابها نشرت أو لم تنشر .

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ضوابط النشر:

يشترط في البحوث العلمية المقدمة للنشر أن يراعى فيها ما يأتي :

- أصول البحث العلمي وقواعده .
- ألا تكون المادة العلمية قد سبق نشرها أو كانت جزءا من رسالة علمية .
- يرفق بالبحث تزكية لغوية وفق أنموذج معد .
- تعدل البحوث المقبولة وتصحح وفق ما يراه المحكمون .
- التزام الباحث بالضوابط التي وضعتها المجلة من عدد الصفحات ، ونوع الخط ورقمه ، والفترات الزمنية الممنوحة للتعديل ، وما يستجد من ضوابط تضعها المجلة مستقبلا .

تنبيهات :

- للمجلة الحق في تعديل البحث أو طلب تعديله أو رفضه .
- يخضع البحث في النشر لأولويات المجلة وسياستها .
- البحوث المنشورة تعبر عن وجهة نظر أصحابها ، ولا تعبر عن وجهة نظر المجلة .

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Relationship between Amylase and Amylase Creatinine Clearance in Non-Insulin-Dependent Diabetics at the Diabetes and Endocrine Therapy Center in Alkoms, Libya

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ABSTRACT*:* In this study, 91 participants were randomly selected from the Center for Diabetes and Endocrinology Alkoms-Libya. Then, the participants were split into two groups: the 66 patients and the 25 participants in the control group. All the special measurements were taken for the patient and control groups, such as: fasting blood sugar, HbA1c, serum amylase, urine amylase, blood and urine creatinine, the amylase creatinine clearance rate was calculated by a certain equation. Safety evaluations included vital signs of laboratory parameters.

The mean and standard error for all cases in this investigation were as follows for the following measurements: fasting blood sugar, HbA1c, serum amylase, urine amylase, and amylase creatinine clearance as follows: 148.38 ± 8.43 mg/dl, 6.31 ± 0.22%, 46.29 ± 4.94 U/l, 176.48 ± 17.95U/l, 1.15 ± 0.16% respectively. When comparing the mean and standard error between patients and control for: fasting blood sugar, HbA1c, serum amylase, urine amylase, amylase creatinine clearance as follows: 86.08±1.77 mg/dl, 4.61±0.06%, 37.48±4.94U/l, 143.16±18.51U/l, 1.37±0.19% respectively, Patients were 171.98±10.20mg/dl, 6.95±0.26%, 49.62±6.53U/l, 189.11±23.63U/l, 1.07±0.21% respectively, where the group of patients was higher than control except for amylase creatinine clearance was higher in control group. The comparisons in the different blood clinical parameters of the two groups, there were no significant relationships except for a relationship between the disease and serum amylase. The value of p-value = 0.05, which means that a relationship is at a significant level of 5%. There was also a relationship between fasting blood sugar and serum amylase, where p-value = 0.04.

According to the results of this study, low levels of amylase and low levels of amylase creatinine clearance occur in the absence of pancreatitis, high levels of amylase increase the likelihood of developing pancreatitis, and none of the participants had Insulin Dependent Diabetes Mellitus. There was an increase in serum and urine amylase levels in diabetics compared to control, after collecting the data and analyzing it. It is obvious that there is an increase in amylase level in serum, urine amylase, except for amylase level where it is decreased, which indicate that the high blood sugar is connected to the enzyme amylase.

Key words: Non-insulin dependent diabetes, Diabetes, Amylase creatinine, Pancreatitis, Mellitus, Serum amylase, Hormones, Blood sugar.

NTRODUCTION

A metabolic condition known as diabetes mellitus is characterized by hyperglycemia brought on by abnormalities in insulin secretion, insulin action, or both (Khatib, 2006). Fasting plasma glucose levels over 126 mg/dl (7.0 mmol/L) or 2-hour plasma

glucose levels over 200 mg/dl (11.1 mmol/L) are considered signs of diabetes mellitus (Sobel and Schneider, 2002). Diabetes chronic hyperglycemia is linked to significant long-term damage, dysfunction, and failure of many organs, especially the kidneys, eyes, nerves, heart, and blood vessels (Mann and Stewart, 2000). Type 2 diabetes mellitus is a heterogeneous disease that frequently results in weight issues, persists over nutrition, takes into account genetic susceptibility to cause impaired insulin signaling-insulin resistance, as well as a relative insulin deficiency of a non-autoimmune etiology, and develops. (Muoio and Newgard, 2008).

Insulin is the main hormone responsible for coordinating the absorption of glucose into cells from the bloodstream and also transforms glucose in the liver to glucagon and releases muscle insulin into blood cells in reaction to a high blood glucose level. The enzymes secreted through the pancreas, they excreted as ineffective and when you enter into the channel gastrointestinal turn become effective and helps in digestion of food. One of these enzymes amylase enzyme is a type of carbohydrate hydrolyzing enzyme. Amylase is secreted from acinar cells in the pancreas and enters the blood vessels large lymph thru the pancreatic duct when increasing hydrostatic pressure in it, which leads to higher speedy in amylase awareness in the blood (Smith *et al*., 1997). Insulin is a tiny protein made up of two peptide chains termed A and B that are joined together by two disulfide links. The A chain has 21 amino acid residues while the B chain has 30 amino acid residues (Lullman *et al*., 2000). Insulin is stored as an inactive proinsulin in the secretory vesicles. The cleavage of a linking peptide (C-peptide) to create two peptide chains connected by two disulfide bridges results in the conversion of proinsulin to insulin (Petersen, 2007).

Insulin attaches to the α-subunit of its receptor, which is located outside the cell membrane. This results in the -subunit receptor's auto phosphorylation, which pushes it into the cell's cytoplasm and activates tyrosine kinase. The activation of the receptor tyrosine kinase triggers a series of cellular phosphorylation reactions that alter the activity of enzymes, including insulin receptor substrates, which mediate the effects of insulin. These outcomes including stimulation of fat synthesis and storage, activation of protein synthesis and storage, and increase of glucose absorption and storage, notably in muscle and liver cells (Gyton and Hall, 2006).

The results show that there was a significant decline in serum amylase and serum lipase in diabetic patients compared to controls who were age and sex matched, as well as a pancreatic exocrine destruction in type 2 Diabetes Mellitus (Vishwanath *et al*., 2019). Although the majority of research on diabetes has been on dyslipidemia as a significant risk factor for cardiac, cerebral, and renal problems, the study amply demonstrates how both type 1 and type 2 diabetes affect pancreatic exocrine function. They propose that examination of serum pancreatic enzymes may provide additional useful information for determining the severity and progression of the illness as well as the response to therapy (Aughsteen *et al*., 2005).

The pancreas serves both as an organ of digestion and an organ of the endocrine system by secreting digestive enzymes and endocrine hormones. Early research has shown that people with type 1 diabetes, severe long-term type 2 diabetes, or chronic pancreatitis have lower serum amylase levels than healthy persons. According to their findings, metabolic syndrome and diabetes in asymptomatic persons were linked to low serum amylase levels. By reexamining earlier data from participants who had not had oral hypoglycemic medication or insulin treatment for their diabetes, they looked

into the underlying connection between serum amylase and cardiometabolic characteristics. It is likely because of decreased renal function that older patients had higher serum amylase levels than younger subjects. It seemed predicted that serum amylase would function in a manner comparable to other cardiometabolic protective factors (Nakajima *et al*., 2011 and Zhuang *et al*., 2016). The pancreas is made up of two main types of tissues: the islets of langerhans, which produce insulin and glucagon directly into the blood, and the digestive juice-secreting cells, which secrete digestive juices into the duodenum. Alpha, beta, and delta cells, which make up 1 to 2 million of the islets of langerhans, are three primary cell types that may be separated from one another by their morphology and staining properties. Approximately 60% of all cells are beta cells, which are mostly located in the center of the islet and release insulin. About 25% of the total cells are alpha cells, which release glucagon, and 10% are delta cells, which secrete somatostion, which has crucial activities that are unclear (Gyton and Hall, 2006; Walter and Emilel, 2005).

This study was conducted to investigate the effects of non-insulin dependent diabetes on pancreatic amylase. The primary goal is to show how diabetes affects the pancreatic enzyme amylase, which is not insulin dependent, and to contrast the outcomes between people with and without diabetes.

MATERIAL AND METHODS

Samples:

Blood collected divided to 2.5ml in EDTA containers for HbA1c and 2.5ml in plane containers for serum creatinine and serum amylase. The samples were collected under aseptic conditions. For serum creatinine, after clotting centrifuged for 3 min at 3000 RPM to obtain serum, and analyzed. Biosystems Model=BTS.350 Spain – Centrifuge - EDTA tube and Sterile plane tube - Disposable syringes - 70% alcohol – Tourniquets – Cotton - Micropipettes (automatic pipettes) - Graduated pipettes.

The collection of blood samples and urine of patients with diabetes type II.

Patients: 66 patients of type 2 Diabetes mellitus 35 females and 31 males ranged between ages (38-86) visiting Center for treatment diabetes and endocrine- alkoms during October 2017 to April 2018. Therapy for follow up check-ups will be included in this study. All participants will be given informed consent for the use of their medical data for research thesis. The medical history and the physical examination done for each patient. An inclusion criterion for them males and females with type 2 Diabetes mellitus in different ages without complications or any co-morbid conditions like hypertension, coronary artery disease, etc. 25 non-diabetic healthy 13 males and 12 healthy female's individuals who visited Center for medical check-ups considered as Control group. The fasting venous blood collected from all case to detect the fasting blood glucose, glycosylated hemoglobin (HbA1c), serum amylase and serum creatinine. On other hand, the urine sample also collected to detect the amylase and creatinine level in them.

The collected blood samples in non heparinzed tubes. Centrifuge samples containing precipitate before performing the assay Biosystems bun analyzer set was used. Glucose kits (Biomaghreb- Tunisia). The collected blood from the saphenous vein by venipuncture the tube used. allows to clot, and separate the serum by centrifugation (2000 x g). A cuvette 2 ml was taken, 1000 µL from Glucose solution into cuvette was added,10 µL from the standard solution, 10 µL each of samples were added, was mixed and incubated for 10 min at 37 °C mix stability 30 min, Cuvette

samples were absorbed by spectrophotometer 450nm. Blood collection tubes containing EDTA for Hba1c (lavender tube) were used then samples were put in Nyco card reader II. glycated hemoglobin (Roche diagnostic Gm bH). 5 µL whole blood to the test tube with R1/Reagent was added. Was mixed well. the tube was left for a minimum of 2 minutes. 25 µL of the mixture was applied to a TD/Test Device. the pipette approx was held for a minimum of 10 seconds. 25 µL R2/Washing Solution was applied to the TD/Test Device for minimum 10 seconds. The test results were read within 5 minutes using the NycoCard READER II. **(IECR, 2009).**

Amylase Enzyme:

It analyzes the enzyme amylase which hydrolyses starch into sugar maltose and glucose. The difference between the read control tube and detector tube in a specified period to give the speed of the enzyme. Samples will be estimated by fully automated biochemistry analyzer (Biosystems). Collected serum samples standardized by sampling tubes non heparinzed. The urine samples were put in containers; but urine samples you need to mitigation to normal saline. Centrifuge samples containing precipitate before performing the assay. Amylase kits (analyticon, Centronic GmbH – Germany). 1000 µL from the R1/ Reagent was added, 200 µL from the R2/ Reagent, and 40 µL from serum sample and 20 µL from urine sample were added. The absorbance was mixed and read for 2 minutes, and then the process was repeated. The exact reading was 1, 2 and 3 minutes. The changes were determined in absorbance (δA/min). **(Junge *et al*., 1989).**

Creatinine test:

$$\text{ACCR (\%)} = \frac{\text{Urine amylase (U/L) X Serum creatinine (mg /L)}}{\text{Serum amylase (U/L) X Urine creatinine (mg /L)}} X\ 100$$

(ACCR): A= Amylase, C= Creatinine, C= Clearance, R= Rate. **(Underwood, 1979).**

Creatinine test: The collected blood samples in non heparinzed tubes. Centrifuge samples containing precipitate before performing the assay Biosystems bun analyzer set was used. Creatinine kits (Biomaghreb- Tunisia). 500 µL from the R1/ Reagent was added, 500 µL from the R2/ Reagent. 100 µL from the standard solution, 100 µL from serum sample and urine sample were added after dilution 1:10. the mixture was mixed and read in less than 30 seconds **(Henry, 1984).**

Statistical Analysis:

The data were analyzed using Percentage and frequency, ANOVA, Chi square, Mean by SPSS Virsion:21 **(SAS, 2006).**

RESULTS

Among the 91 participants, there were 66 patients, 31males (M) and 35 females (F); similarly, of the 25 non-diabetic people (controls), there were 13 males and 12 females. Table 1 displays the characteristics of each participant group.

Table (1): Percentage and Number of male and female

Characteristics	Sex	Number	Percent
Control	Female	12	48
	Male	13	52
Patients	Female	35	53.03
	Male	31	46.96

Clinical characteristics for all cases:

The (mean and ± SE) of age, weight, fasting blood sugar, HbA1c, serum amylase, urine amylase, amylase creatinine clearance levels are shown in Table (2).

Table (2): The (mean and ± SE) of age, weight, fasting blood sugar, HbA1c, serum amylase, urine amylase, amylase creatinine clearance levels, N= 91

Characteristics		Age	Weight (kg)	Sugar (mg/dl)	HbA1C (%)	Serum Amylase (U/I)	Urine Amylase (U/I)	ACCR (%)
Control	Minimum	37	50	67	4.1	10	33	0.25
	Maximum	56	83	105	5.1	85	405	3.7
	Mean	45.84	66.36	86.08	4.61	37.48	143.16	1.37
	Std. Error of Mean	1.04	1.91	1.77	0.06	4.94	18.51	0.19
	Std. Deviation	5.19	9.55	8.86	0.28	24.70	92.54	0.95
Patients	Minimum	38	57	45	4.3	5	22	0.03
	Maximum	86	124	396	12.8	272	868	9.87
	Mean	61.17	77.98	171.98	6.95	49.62	189.11	1.07
	Std. Error of Mean	1.42	1.49	10.20	0.26	6.53	23.63	0.21
	Std. Deviation	11.51	12.09	82.88	2.08	53.04	191.98	1.71
Total	Minimum	37	50	45	4.1	5	22	0.03
	Maximum	86	124	396	12.8	272	868	9.87
	Mean	56.96	74.79	148.38	6.31	46.29	176.48	1.15
	Std. Error of Mean	1.28	1.31	8.43	0.22	4.94	17.95	0.16
	Std. Deviation	12.26	12.53	80.43	2.06	47.16	171.25	1.54

The mean ± SE levels of age, weight, fasting blood sugar, HbA1c, amylase levels in serum, urine, and creatinine clearance were 56.96 ± 1.28, 74.79 ± 1.31 kg, 148.38 ± 8.43 mg/dl, 6.31 ± 0.22%, 46.29 ± 4.94 U/l, 176.48 ± 17.95U/l, 1.15 ± 0.16%, respectively. The mean ± SE levels in this experiment may different from other studies.

Clinical characteristics for Type II diabetes mellitus for patients and control:

Table (3) and figures (2,3,4) compare various clinical parameters between patients and the control group.

Table (3): Comparison between the control and patients for clinical parameters

Characteristics		Age	Weight (kg)	Sugar (mg/dl)	HbA1C (%)	Serum Amylase (U/I)	Urine Amylase (U/I)	ACCR (%)
Control	Mean	45.84	66.36	86.08	4.61	37.48	143.16	1.37
	Std. Error of Mean	1.04	1.91	1.77	0.06	4.94	18.51	0.19
	Std. Deviation	5.19	9.55	8.86	0.28	24.70	92.54	0.95
Patients	Mean	61.17	77.98	171.98	6.95	49.62	189.11	1.07
	Std. Error of Mean	1.42	1.49	10.20	0.26	6.53	23.63	0.21
	Std. Deviation	11.51	12.09	82.88	2.08	53.04	191.98	1.71

(Means± SE)

The mean ± SE levels in control for age, weight, fasting blood sugar, HbA1c, amylase levels in serum, urine, and creatinine clearance were 45.84±1.04,66.36±1.91 kg, 86.08±1.77 mg/dl, 4.61±0.06%, 37.48±4.94U/l, 143.16±18.51U/l, 1.37±0.19%, respectively. The mean ± SE levels in patients for age, weight, fasting blood sugar, HbA1c, serum amylase (S AM), urine amylase (U AM), and amylase creatinine clearance (ACCR) were 61.17±1.42, 77.98±1.49kg, 171.98±10.20mg/dl, 6.95±0.26%, 49.62±6.53U/l, 189.11±23.63U/l, 1.07±0.21%, respectively. The variables of blood for diabetes mellitus type 2 patients are higher than controls in all parameters.

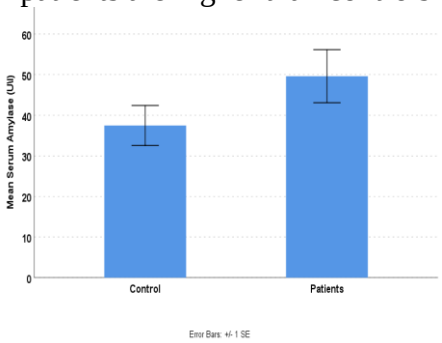

Fig (1): Serum Amylase (U/l) (Means ± SE) in control and patients

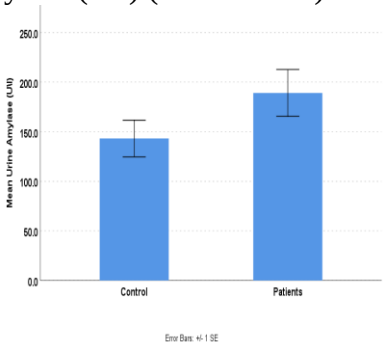

Fig (2): Urine Amylase (U/l) (Means ± SE) in control and patients.

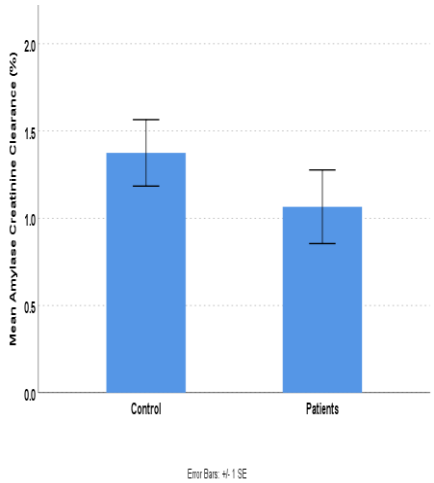

Fig (3): Amylase Creatinine Clearance (%) (Means ± SE) in control and patients.

Clinical data and serum amylase relationships:

The association between serum amylase, age, and HbA1c was determined to be insignificant because the probabilistic values were greater than 0.05, are shown in tables (4,5) using a Chi square.

Table (4): Relationship between age and serum amylase

Item				Serum Amylase U/l			Total	Test	P-value
				Less than 28y	28 to 100	More than 100			
Control	HbA1c %	Less than 4.5	Count	3	4		7	0.103	0.999
			HbA1c %	42.90%	57.10%		100.00%		
		4.5 to 6.3	Count	9	9		18		
			HbA1c %	50.00%	50.00%		100.00%		
	Total		Count	12	13		25		
			HbA1c %	48.00%	52.00%		100.00%		
Patients	HbA1c %	Less than 4.5	Count	0	1	0	1	4.109	0.312
			HbA1c %	0.00%	100.00%	0.00%	100.00%		
		4.5 to 6.3	Count	11	15	3	29		
			HbA1c %	37.90%	51.70%	10.30%	100.00%		
		More than 6.3	Count	21	12	3	36		
			HbA1c %	58.30%	33.30%	8.30%	100.00%		
	Total		Count	32	28	6	66		
			HbA1c %	48.50%	42.40%	9.10%	100.00%		

The level of p-value = 0.9 is greater than 0.05, there is no relationship between age and serum amylase, Chi- Square=0.8 for control, Chi- Square=1.5 for Patients.

Table (5): Relationship between HbA1c and serum amylase

Item				Serum Amylase U/l			Total	Test	P-value
				Less than 28y	28 to 100	More than 100			
Control	F_age	Less than 40y	Count	2	1		3	0.476	0.593
			% F_age	66.70%	33.30%		100.00%		
		40 to 60 y	Count	10	12		22		
			% F_age	45.50%	54.50%		100.00%		
	Total		Count	Count	12	13	25		
			% F_age	48.00%	52.00%		100.00%		
Patients	F_age	Less than 40	Count	0	1	0	1	1.572	0.909
			% F_age	0.00%	100.00%	0.00%	100.00%		
		40 to 60 y	Count	16	15	3	34		
			% F_age	47.10%	44.10%	8.80%	100.00%		
		More than 60y	Count	16	12	3	31		
			% F_age	51.60%	38.70%	9.70%	100.00%		
	Total		Count	32	28	6	66		
			% F_age	48.50%	42.40%	9.10%	100.00%		

The level of p = 0.9 for control is greater than 0.05, p= 0.3 for patients there is no relationship between HbA1c and serum amylase, Chi- Square=0.14 for control, Chi-Square=4.1 for Patients.

Relationship between Urine Amylase and clinical data:

The relationship between urine amylase, age, HbA1c, sex was assessed as not significant because the probabilistic values were greater than 5%, are shown in Tables (6,7,8) using a Chi square.

Table (6): Relationship between age and urine amylase

Item				Urine Amylase			Total	Test	P-value
				Less than 28	28 to 100	More than 100			
Control	F_age	Less than 40y	Count	2	1		3	0.476	0.593
			% F_age	66.70%	33.30%		100.00%		
		40 to 60y	Count	10	12		22		
			% F_age	45.50%	54.50%		100.00%		
	Total		Count	12	13		25		
			% F_age	48.00%	52.00%		100.00%		
Patients	F_age	Less than 40	Count	0	1	0	1	1.572	0.909
			% F_age	0.00%	100.00%	0.00%	100.00%		
		40 to 60 y	Count	16	15	3	34		
			% F_age	47.10%	44.10%	8.80%	100.00%		
		More than 60 y	Count	16	12	3	31		
			% F_age	51.60%	38.70%	9.70%	100.00%		
	Total		Count	32	28	6	66		
			% F_age	48.50%	42.40%	9.10%	100.00%		

The level of p-value = 0.5 is greater than 0.05, there is no relationship between age and urine amylase, Chi square= 1.0.

Table (7): Relationship between HbA1c and urine amylase

Item				Urine Amylase		Total	Test	P-value
				Less than 450	More than 450			
Control	HbA1c %	Less than 4.5	Count	7		7		
			% HbA1c	100.00%		100.00%		
		4.5 to 6.3	Count	18		18		
			% HbA1c	100.00%		100.00%		
	Total		Count	25		25		
			% HbA1c	100.00%		100.00%		
Patients	HbA1c %	Less than	Count	1	0	1	0.16	0.999
			%	100.00%	0.00%	100.00%		

		4.5	HbA1c					
		4.5 to 6.3	Count	25	4	29		
			% HbA1c	86.20%	13.80%	100.00%		
		More than 6.3	Count	31	5	36		
			% HbA1c	86.10%	13.90%	100.00%		
	Total		Count	57	9	66		
			% HbA1c	86.40%	13.60%	100.00%		

The level of p = 0.9 is greater than 0.05, there is no relationship between HbA1c and urine amylase, Chi square= 0.16.

Table (8): Relationship between sex and urine amylase

Item				Urine Amylase		Total	Test	P-value
				Less than 450	More than 450			
Control	Sex	Female	Count	12		12		
			% Sex	100.00 %		100.00 %		
		Male	Count	13		13		
			% Sex	100.00 %		100.00 %		
	Total		Count	25		25		
			% Sex	100.00 %		100.00 %		
Patients	Sex	Female	Count	31	4	35	0.308	0.724
			% Sex	88.60%	11.40%	100.00 %		
		Male	Count	26	5	31		
			% Sx	83.90%	16.10%	100.00 %		
	Total		Count	57	9	66		
			% Sex	86.40%	13.60%	100.00 %		

The level of p = 0.72 is greater than 0.05, there is no relationship between sex and urine amylase, Chi square= 0.3.

Relationship between Amylase Creatinine Clearance and clinical data:

The relationship between amylase creatinine clearance, fasting blood sugar, HbA1c, age was assessed as not significant because the probabilistic values were greater than 5%, are shown in Tables (9,10,11) using a Chi square.

Table (9): Relationship between fasting blood sugar and amylase creatinine clearance

Item				ACCR		Total	Test	P-value
				Less than 5	More than 5			
Control	Sugar mg/dl	Less than 120	Count	14		14		
			% Sugar mg/dl	100%		100%		
	Total		Count	14		14		
			% Sugar mg/dl	100%		100%		
Patients	Sugar mg/dl	Less than 120	Count	20	0	20	1.617	0.655
			% Sugar mg/dl	100%	0.00%	100%		
		120 to 140	Count	9	0	9		
			% Sugar mg/dl	100%	0.00%	100%		
		More than 140	Count	35	2	37		
			% Sugar mg/dl	94.60%	5.40%	100%		
	Total		Count	64	2	66		
			% Sugar mg/dl	97.00%	3.00%	100%		

The level of p-value = 0.65 is greater than 0.05, there is no relationship between fasting blood sugar and amylase creatinine clearance, Chi square= 1.6.

Table (10): Relationship between HbA1c and amylase creatinine clearance

Item				ACCR		Total	Test	P-value
				Less than 5	More than 5			
Control	HbA1c %	Less than 4.5	Count	7		7		
			% HbA1c	100.00%		100.00%		
		4.5 to 6.3	Count	18		18		
			% HbA1c	100.00%		100.00%		
	Total		Count	25		25		
			% HbA1c	100.00%		100.00%		
Patients	HbA1c %	Less than 4.5	Count	1	0	1	0.056	0.999
			% HbA1c	100.00%	0.00%	100.00%		
		4.5 to 6.3	Count	28	1	29		
			% HbA1c	96.60%	3.40%	100.00%		
		More than 6.3	Count	35	1	36		
			% HbA1c	97.20%	2.80%	100.00%		
	Total		Count	64	2	66		
			% HbA1c	97.00%	3.00%	100.00%		

The level of p-value = 0.9 is greater than 0.05, there is no relationship between HbA1c and amylase creatinine clearance, Chi square= 0.11.

Table (11): Relationship between age and amylase creatinine clearance

Item				ACCR		Total	Test	P-value
				Less than 5	More than 5			
Control	F_age	Less than 40 y	Count	3		3		
			% F_age	100.00%		100.00%		
		40 to 60 y	Count	22		22		
			% F_age	100.00%		100.00%		
	Total		Count	25		25		
			% F_age	100.00%		100.00%		
Patients	F_age	Less than 40 y	Count	1	0	1	0.036	0.999
			% F_age	100.00%	0.00%	100.00%		
		40 to 60 y	Count	33	1	34		
			% F_age	97.10%	2.90%	100.00%		
		More than 60 y	Count	30	1	31		
			% F_age	96.80%	3.20%	100.00%		
	Total		Count	64	2	66		
			% F_age	97.00%	3.00%	100.00%		

The level of p-value = 0.9 is greater than 0.05, there is no relationship between age and amylase creatinine clearance, Chi square= 0.03

Relationship between Serum, Urine Amylase and Amylase Creatinine Clearance and clinical data by Analysis of variance:

There is a relationship between disease and serum amylase, there was also a relationship between fasting blood sugar and serum amylase, because the p-values were less than 5%, are shown in Tables (12,13,14).

Table (12): Analysis of variance between serum amylase and both disease (Diabetes Mellitus II) and fasting blood sugar

Tests of Between-Subjects Effects					
Dependent Variable: Serum Amylase					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Disease	8050.718	1	8050.718	3.750	.056
N_sugur	8559.847	1	8559.847	3.987	.049
Error	188923.924	88	2146.863		
Total	395112.000	91			
Corrected Total	200156.571	90			

From the variance analysis table, there is a relationship between disease (Diabetes Mellitus II) and serum amylase, where p-value = 0.05, which means that the relationship is at a significant level of 5%, There was also a relationship between fasting blood sugar and serum amylase, where p-value = 0.04.

Table (13): Analysis of variance between urine amylase and fasting blood sugar

Tests of Between-Subjects Effects					
Dependent Variable: Urine Amylase					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
N_sugur	44800.550	1	44800.550	1.542	.218
Error	2556349.067	88	29049.421		
Total	5473752.000	91			
Corrected Total	2639426.725	90			

From the analysis table, there is no a relationship between fasting blood sugar and amylase of urine. The level of p-value = 0.2 are greater than 5%.

Table (14): Analysis of variance between amylase creatinine clearance and weight

Tests of Between-Subjects Effects					
Dependent Variable: Amylase Creatinine Clearance					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Weight	6.301	1	6.301	2.685	105
Error	206.542	88	2.347		
Total	335.040	91			
Corrected Total	214.577	90			

From the variance analysis table, there is no a relationship between weight and amylase creatinine clearance, where p-value = 0.1 was greater than 0.05. Diabetes mellitus is prevalent globally as well as in the Libya.

DISCUSSION

There is a dearth of published information in our country's research on human diabetes. According to projections, there will be 366 million persons with diabetes worldwide by 2030, up from 171 million in 2000. (Wild *et al*., 2004).

The sample size was 91 out of them 66 were Diabetic and 25 were Non- Diabetic individuals (control). The participants were diabetic patients who had been referred to the Diabetes and endocrine Center, Alkoms- Libya. The mean ages of the patients (those with type 2 diabetes) and controls were 45.84 1.04 and 61.17 1.42 years, respectively. According to Rodger (1991) and Umpierrez et al. (2006), type 2 diabetes mellitus often appears after the age of 40. It has been discovered that having diabetes runs in the family. This result is consistent with other research that found a family history of diabetes to be a risk factor (Annis et al., 2005; Harrison et al., 2003; Pijl et al., 2009 and Yassin et al., 2011). According to the study's data, patients had higher average fasting blood sugar, HbA1c, serum amylase, and urine amylase levels than controls. The findings of certain researchers, like Aughsteen et al. (2005) and Nakajima et al (2011) and Vishwanath et al. (2019).

Elevated amylase leads to pancreatitis and this causes the enzyme to leak from the pancreatic canal to the blood instead of the duodenum (Smith *et al.,* 1997). The increase urine amylase is due to the increased filtration of amylase from the kidney as it is characterized by small particles and therefore easily filtered (Abou- Seif and Youssef, 2004) In the absence of pancreatitis, the pancreatic enzyme demonstrates a decrease in the level of amylase and an increase in the level of trypsinogen. (Balk *et*

al., 1975). whereas the clearance of amylase from the body was lower in patients than in controls, Murray et al. (1974) also found a similar result, which they attributed to the glomerulus's poor ability to filter amylase. It was thought that rare diseases would lead to low serum amylase (Seno *et al*., 1995; Nakajima, 2016).

These results increased of serum amylase was 49.62 U/l compared with the control group 37.48U/l. Amylase levels in urine from diabetes patients were significantly higher than those from the control group, coming in at 189.11 U/l versus 143.16 U/l, according to the urine study. The study also showed significant decrease in the occurrence of the amylase creatinine clearance rate to 1.07% compared with the control group 1.37% these values were lower than serum amylase 262 U/l Compared with the control group 140 U/l the urine study has shown a significant rise in the value of the enzyme amylase in urine in patients with diabetes 541U/l compared with the control group 313U/l, the study also showed significant increase in the occurrence of the amylase creatinine clearance rate to 7.8% compared with the control group 3.19% reported by Bakaa, (2008).

The amylase creatinine clearance in patients in this study was1.07±0.21% and control was1.37±0.19% this result was lower than the value 9.8 ± 3.5 (Warshaw and Fuller, 1975; Tanvi *et al*, 2017). The specificity of serum amylase to identify pancreatic disorders is too low (Vissers et al., 1999 and Harper et al., 2011). Potential hyperamylasemia markers include urine amylase. Urine amylase and ACCR were the variables from urine samples that were examined (Gambill and Mason, 1963).

Amylase levels in the blood are correlated with illness occurrence. Additionally, a correlation between fasting blood sugar and serum amylase was found, and Nakajima et al. (2011) findings are supported by the fact that people with normal or mildly impaired glucose metabolism (HbA1c up to 6.0%) may have more complex HbA1c levels.

This the point has not been discussed as far as we know before, the relationship between fasting blood sugar; Because the higher the fasting blood sugar but other things there is no relationship, while amylase was positively with diabetes and negatively with creatinine clearance rate. The serum amylase level increased, while urine amylase showed a decrease in creatinine clearance. The normal range for Amylase creatinine clearance ranging from 1-5 % but it is influenced by the quality of the method used to measure the effectiveness of amylase. There cases increase to more than 5%, such as burns, diabetic Ketoacidosis, acute renal failure or severe renal insufficiency and pancreatic cancer. however, this ratio remains strong evidence of damage to the pancreas. as for if the ratio is less than 1% This indicates Macro amylasemia where amylase cannot run through the kidney because of their large size, where up molecular weight of more than 200,000 Daltons. The increase in size is done through amylase link pancreatic or salivary protein so it remains in the blood not to run during kidney (Seno *et al.*, 1995).

Low serum amylase levels are linked to Type 2 diabetes, indicating a potential exocrine-endocrine connection in this condition. Its function as a useful marker in numerous other clinical pancreatic disorders needs to be clarified, nevertheless (Vantyghem *et al.,* 1999).

The decrease in serum amylase levels in type 2 diabetes mellitus was observed to produce similar outcomes (Vishwanath et al.2019).

The excretion of amylase in the urine is a very sensitive marker for acute pancreatitis. When the serum concentration was abnormal, the urinary excretion remained abnormal always, and the excretion remained abnormal for a considerable amount of time even after the serum concentration had returned to normal. In order to diagnose fading pancreatitis and to provide convalescent care for acute pancreatitis, the urine amylase excretion is a valuable monitor. Urinary levels may be more sensitive than serum levels because pancreatitis causes an increase in the removal of pancreatic enzymes from the circulation through the urine. It is advised to measure the amount of amylase in the urine for these reasons. After serum levels have returned to normal, urine amylase levels typically stay high for a few days. Amylase in the urine was discovered to significantly correlate (Clavien *et al*., 1989).

CONCLUSION

From these results we concluded, that low levels of amylase and low levels of amylase creatinine clearance occur in the absence of pancreatitis, greater levels of amylase are associated with a higher chance of developing pancreatitis, and none of these conditions cause insulin-dependent diabetes mellitus. Blood and urine samples were tested for amylase and creatinine. Diabetes was positively associated with amylase, while creatinine clearance rate was adversely associated with amylase, and there was an increase in serum and urine amylase levels in diabetics compared to controls. The results show that the amylase enzyme plays a role in the elevated fasting blood sugar. Amylase levels in the serum and urine have increased, but urine amylase creatinine clearance has reduced.

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