IRAQI Academic Scientific Journals
العراقية المجلات الأكاديمية العلمية
Al-Kut University College Journal
ISSN (E) : 2616 - 7808 II ISSN (P) : 2414 - 7419
www.kutcollegejournal.alkutcollege.edu.iq
k.u.c.j.sci@alkutcollege.edu.iq
Special Issue for the Researches of the 5th Int. Sci. Conf. for Creativity for 13-14 December 2023

A practical study to evaluate the role of amylase among diabetics patients who visit health centers in Dhi-Qar Governorate

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Abstract

Diabetes mellitus is a pancreatic endocrine condition brought on by insufficient insulin synthesis and/or resistance to the hormone's effects. Its endocrine and exocrine parts are closely related anatomically and functionally, both directly and indirectly. Thus, we are investigating the role of serum amylase in Type 2 Diabetes (DM). The study's goals are to determine the serum amylase levels in type-2 diabetes mellitus patients and to establish a correlation between those patients' serum amylase levels and HbA1c levels. Studying serum amylase levels in people with type-2 diabetes mellitus and establishing a correlation between serum amylase levels and HbA1c levels in these patients are the goals and objectives.

Keywords: Type 2 diabetes, Amylase, Endocrine Metabolic Disorders, Pancreas, HbA1c

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Paper Info.
Published: June 2024

دراسة عملية لتقييم دور الأميليز لدى مرضى السكري المترددين على المراكز الصحية في محافظة ذي قار

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المستخلص

داء السكري هو حالة تصيب الغدد الصماء البنكرياسية تنتج عن عدم كفاية تخليق الأنسولين و/أو مقاومة تأثيرات الهرمون. ترتبط أجزائه الغدد الصماء والخارجية ارتباطًا وثيقًا من الناحية التشريحية والوظيفية، بشكل مباشر وغير مباشر. وهكذا، نحن ندرس دور الأميليز في الدم في مرض السكري من النوع 2 (DM). أهداف الدراسة هي تحديد مستويات الأميليز في الدم لدى مرضى السكري من النوع 2 وإقامة علاقة بين مستويات الأميليز في الدم لدى هؤلاء المرضى ومستويات HbA1c. إن دراسة مستويات الأميليز في المصل لدى الأشخاص المصابين بداء السكري من النوع 2 وإقامة علاقة بين مستويات الأميليز في المصل ومستويات HbA1c لدى هؤلاء المرضى هي الأهداف والغايات.

الكلمات المفتاحية : مرض السكري من النوع 2، الأميليز، اضطرابات التمثيل الغذائي في الغدد الصماء، البنكرياس

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معلومات البحث
تاريخ النشر: حزيران 2024

1. Introduction

Diabetes Mellitus (DM) is a metabolic condition brought on by either a complete lack of insulin or a decreased tissue's sensitivity to the hormone. [1] The following blood sugar levels meet the diagnostic criteria for diabetes mellitus: randomblood sugar (RBS) ≥200 mg/dl, glucose free hemoglobin (HbA1C) ≥6.5%, postprandial blood sugar (PPBS) ≥200 mg/dl, and fasting blood sugar level (FBS) ≥126 mg/dl [2] Diabetes is and will continue to be a threat to world health. In the UK, diabetes affects over a million people (at least 2% of the population), and the condition accounts for 5–10% of all medical expenses [3] With over 20 million Indians currently diagnosed with

diabetes and that number expected to rise to 57 million by 2025, the high incidence of diabetes among this population could significantly strain the nation's health budget [4] . The pancreatic exocrine acinar cells produce several enzymes, such as lipase and amylase, which facilitate the breakdown of particular food particles. The primary enzyme in the digestive process that breaks down starch into maltose, maltriose, and alpha-limit dextrin is amylase. The enzyme lipase is primarily produced in the pancreas, travels down the gut, and aids in the breakdown of triglycerides into monoglycerides and fatty acids. When pancreatic enzymes are insufficient, food is not properly digested, leading to malnutrition and poor digestion[5]. Low serum amylase levels associated with advanced pancreatic disease have long been assumed to be a sign of broad pancreatic damage. However, a number of investigations have now demonstrated a connection between metabolic syndrome and diabetes mellitus and this low serum amylase level [6]. Studies examining the effects of hyperglycemia on pancreatic exocrine activities in patients with type 2 diabetes found that, although still below control levels, serum lipase and amylase levels significantly increased in response to glycemic control management. There was a significant negative correlation seen between basal FBS, HbA1c, and serum lipase and amylase [7] .

2. Goals of the research:

This research was done to assess the amylase activity in people with type 2 diabetes.

3. Subjects and Methods

This research paper was carried out on patients with type 2 diabetes in the months of December 2022 to November 2023 in the Chemistry and Blood Laboratories Division of the Imam Hussein Teaching Hospital, peace be upon him, as well as in laboratories in medical clinics. Patients with type 2 diabetes who were on treatment and had received a prior diagnosis were also included. They were compared to a group of age- and gender-matched healthy volunteers. The purpose of the study was to assess the level of amylase activity in type 2 diabetics living in Nasiriya City. assessing the condition of the health of ten and twenty patients. who, as seen in Figure (1), randomly selected twelve females and eighteen males as show in figure (1).

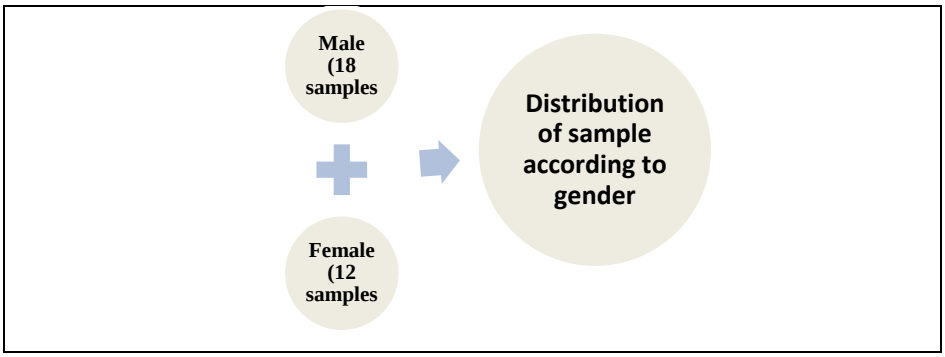

Figure (1): Distribution of sample according to gender

Sperm correlation was used to examine the relationship between the research groups. The number and percentages of the discrete, non-parametric variables were shown. For comparisons of discrete variables between the research groups, the chi square test was employed. When the predicted cell count of more than 25% of instances was less than five, Fisher's exact test was applied.

4. RESULTS

Diabetes is a global issue that will undoubtedly surpass other causes as the primary cause of illness and death in the coming years as its incidence rises. Pancreatic dysfunction is always connected with diabetes. The pancreas is both an endocrine and a digestive organ in our bodies. The current study was conducted to investigate the complex interplay between the two functional components of this organ. It was possible to assess whether there was an exocrine-endocrine relationship between the pancreas and the 20 known cases of Type 2 diabetes (group I, n=20) and the 10 healthy people (group II, n=10) by comparing serum amylase levels and blood glucose in the two groups. The clinical characteristics of the study subjects are shown in **Table (1).** The two groups had comparable mean ages: the group of diabetes patients was **54.11** years old, and the group of healthy controls was **51.89** years old. Although the patient group's serum amylase activity did not change significantly from the controls, its HbA1c decreased dramatically (**p = 0.001**) when compared to the controls as show in table **(1)**.

Table (1): Comparison of study variables among patient and healthy control groups

Variables	patients group (mean±SD)	Healthy control group (mean±SD)	Mann Whitney test (p – value)
Age (years)	54 ±11	51 ± 8.9	0.3922
HbA1c (%)	9.1 ± 2.3	5.3 ± 0.30	<0.0001
Amylase (U/L)	90 ± 75	58 ± 15	0.8036

***= difference of statistical significance, p≤ 0.05.**

****= difference of high statistical significance, p≤ 0.005.**

†= difference of no statistical significance, p≥ 0.05.

4.1- statistical analysis of gender-specific data

Table 2 of our findings shows that while there were **26.67%** of males in the control group and **33.33%** of males in the sick group, respectively, there were only **16.67%** females in the patient group as show in table **(2) and (3).**

Table (2): Statistical analysis of data according to gender

P value and statistical significance		
Test	**Fisher's exact test**	
P value	0.2353	
Statistically significant (P < 0.05)?	No	
Sensitivity	0.8	0.4902 to 0.9645
Specificity	0.5	0.2993 to 0.7007
Positive Predictive Value	0.4444	0.2456 to 0.6628
Negative Predictive Value	0.8333	0.5520 to 0.9704

Data analyzed	CONTROL	PATIENTS	Total
MALE	8	10	18
FEMALE	2	10	12
Total	10	20	30

Table (3): Statistical analysis of data according to gender

Percentage of grand total	CONTROL	PATIENTS
MALE	**26.67%**	**33.33%**
FEMALE	**6.67%**	**33.33%**

Percentage of row total	CONTROL	PATIENTS
MALE	**44.44%**	**55.56%**
FEMALE	**16.67%**	**83.33%**
Percentage of column total	**CONTROL**	**PATIENTS**
MALE	**80.00%**	**50.00%**
FEMALE	**20.00%**	**50.00%**

4.2-Correlation of study variables among patient and healthy controlgroups

Table (4) shows that the serum amylase activity and the **HbA1c** in the control group had a significant (**p value≤ 0.05**) positive correlation, while the two variables in the diabetic patients had a significant (**p value ≤0.05**) negative correlation (Pearson's correlation coefficient **r = -0.400*).**However, there was a positive correlation between the patient's age and the serum amylase activity, even if it was not statistically significant. Therefore, compared to individuals with adequate diabetes control, those with poorly controlled diabetes showed lower serum amylase activity as show in table **(4)**.

Table (4): correlation of study variables among patient and healthy control groups

	Age patient	HbA1C Patient	Amylase Patient	age control	HbA1C control	amylase control
Age patient	1.000	-0.241	0.338	-0.123	0.507	0.000
HbA1C Patient	-0.241	1.000	-0.400*	0.197	-0.455	-0.049
Amylase Patient	0.338	-0.400*	1.000	-0.468	0.429	0.148
age control	-0.123	0.197	-0.468	1.000	-0.462	-0.500
HbA1C control	0.507	-0.455	0.429	-0.462	1.000	0.821*
amylase control	0.000	-0.049	0.148	-0.500	0.821*	1.000

***= difference of statistical significance, p≤ 0.05.**

5. DISCUSSION

Diabetes mellitus, one of the most common chronic diseases, endangers the lives of millions of people globally. The age at which type 1 (IDDM) and type 2 (NIDDM) diabetes first manifest and the need for insulin therapy are the main differences between the two types of diabetes. Hyperglycemia and a reduced blood insulin levels are what define them. Pathologic changes in the epidermis, eye lens, cranial and peripheral nerves, and major blood arteries cause diabetes complications. A macrovascular problem is when the large blood arteries in the brain, heart, or extremities are damaged[8] . Examples of microvascular effects of diabetes include retinopathy, nephropathy, and neuropathy.

However, pancreatic exocrine function in diabetes has received very little attention, and the majority of diabetes research has focused on correcting abnormal lipid profiles and restoring normal hyperglycemia. The serum levels of pancreatic amylase in type 2 diabetic patients were compared to those in healthy, non-diabetic individuals in the current study[9] .Analyzing amylase activity revealed that diabetic patients had lower levels of the enzyme than controls, and that this difference was statistically significant at a p value of less than 0.05[10].

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Diabetes is associated with altered protein and fat metabolism in addition to affecting sugar metabolism. Lipase, protease, and amylase are three important enzymes that are essential for managing diabetes since they will help in the digestion of all three types of nutrients—proteins, fats, and sugars. The current work abundantly reveals how pancreatic exocrine function is reduced in type 2 diabetes mellitus, despite the fact that most research on diabetes has focused on dyslipidemia as a key risk factor for cardiac, cerebral, and renal issues. A patient's chronic disease, its course, and how well they reacted to treatment could all be assessed by testing their serum pancreatic enzymes [12] .

6. CONCLUSION

- The current work clearly reveals how pancreatic exocrine function is reduced in type 2 diabetes mellitus, despite the fact that most research on diabetes has focused on dyslipidemia as a key risk factor for cardiac, cerebral, and renal issues. The idea that measuring serum pancreatic enzymes could provide extra useful information for evaluating a patient's chronic condition, its progression, and how well they responded to treatment.
- Our research revealed that type 2 Diabetes Mellitus patients had significantly lower serum amylase activity in regions with higher blood sugar levels.
- This illustrated how the endocrine-exocrine axis of the pancreas was dysfunctional since a disease that affected one part of an organ would also functionally impair the subsequent part of that organ. This fact must be remembered while the patients are receiving treatment.

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