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The effect of Diabetes mellitus disease on the calcium levels in the Endocrinology and Diabetes Hospital in Emsallata patients

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Abstract

Diabetes mellitus can be considered as a chronic metabolic disorder categorized by the level of blood glucose which resulting from the defects of insulin secretion, insulin action, or both. Therefore, it is a known as a primary cause of morbidity and mortality in the worldwide, because its prevalence continues to rise, mainly in developing countries. Understanding the changes of biochemical associated with diabetes is crucial for disease management and the prevention of complications.

This research aims to examine the relationship between, the serum of diabetes mellitus and calcium level. The research has conducted on 100 diabetic patients at the Endocrinology and Diabetes center in Emsallata, and ran on 48 males and 52 females.

The research showed no statistically significant relationship between the levels of calcium, and the presence of diabetes mellitus.

Introduction

Diabetes mellitus (DM) is known as a metabolic disease, engaging inappropriately levels of elevated blood glucose. DM has several categories, including type 1, type 2, maturity-onset diabetes of the young (MODY), gestational diabetes, neonatal diabetes, and secondary causes because of Endocrinopathies, steroid use, etc. The main subtypes of DM are Type 1 diabetes mellitus (T1DM) and Type 2 diabetes mellitus (T2DM), which classically result from defective insulin secretion (T1DM) and/or action (T2DM). T1DM appear in children or adolescents, while T2DM is said to impact middle-aged or older adults who have prolonged hyperglycemia because of poor lifestyle and dietary choices. It has been noticed that the pathogenesis for T1DM and T2DM is extremely different, and therefore each type has various etiologies, presentations, and treatments. Therefore, Diabetes is one of the most common chronic diseases in the country and worldwide. In the US, DM known as the seventh leading cause of death (Rajaei.et.al.2019)

One of the major minerals is Calcium, where the bodies in need relatively greater amounts in order to keep healthy. Calcium can be found in various sources in animal, plants-based foods, as well as in drinking water. (Clarke .et.al.2023).Calcium is one of the most important minerals for the human body. It helps form and maintains healthy teeth and bones. A proper level of calcium in the body over a lifetime can help prevent osteoporosis. Furthermore, (Ca) helps human body in Building a strong bones and teeth. Blood clotting sends and receiving nerve signals squeezing and in addition to relaxing muscles Releasing hormones and other chemicals (Markell.et. al 2023)

The aim of research:

The aim of this research is to investing the effect of diabetes mellitus disease on calcium levels.

Materials and methods:

The retrospective study of 100 patient's clinic follow-up Diabetes and Endocrinology center in msallata from April till July 2025. The average age of these cases was 20 -90 year. Electrolyte levels were measured in diabetes on a Media device .Through that the level of calcium in diabetes mellitus was measured.

Collection of Data:

To determine the relationship between calcium in diabetes were collected and data were taken, which include height, weight, age, gender, whether the patient was diabetic, or not.

Scope of the research:

The scope of the research was included in clinical chemistry.

Sample Collection and biochemical Analysis:

After completing the data collection phase biochemical tests were performed on the collected samples to determine the consisted of calcium the samples consisted of either serum or plasma and were collected using heparinized tubes to prevent clotting all biochemical measurements were carried out using the MEDICA automated analyzed in accordance with the manufacturer instructions.

Analysis of samples:

1. Serum calcium was measured using a colorimetric method, with absorbance read at a wavelength of 620–650 nm .1mL of Reagent 1 (R1) was added to each of three plastic tubes: Blank, Standard, and Test.

Then, 10 µL of standard solution was added to the Standard tube and 10 µL of serum to the Test tube. After incubation for 5 minutes at room temperature, absorbance was measured using a spectrophotometer. Calcium concentration was calculated using the following formula:

text {Calcium (mg/dL)} = \left(\frac{\text{Absorbance of Test}}{\text{Absorbance of Standard}} \right) \times 10 Reference range: 8.5 – 10.5 mg/dL

Statistical analysis:

The data was entered into a computer after being coded, allowing the necessary statistical operations to be performed for data analysis using the SPSS statistical program. Since we sometimes need to calculate important indicators of the phenomenon under study, we will rely on the following statistical measures:

Frequency distributions: to determine the number of frequencies, and the percentage of repetition of all study variables. Also' Chi2 test to determine differences between response ratios in non-ordinal measures

Results and discussion:

Diabetes mellitus is a chronic metabolic disorder affecting glucose regulation. Recent studies highlight the role of minerals like calcium, in glucose metabolism and insulin function. calcium is involved in insulin secretion. In this research, we also examined how mineral levels vary according to patient age, type of diabetes, and treatment methods, providing further insight into their clinical significance, as shown in the following table:

Demographic characteristics:

4.1- Distribution of sample individuals on the basis of the Age:

The data shown in the table 4.1 regarding the distribution of sample members based on age indicated that (7%) of the sample were under 30 years old, and (8%) of the sample were aged from 30 to less than 40 years, and (9%) of the sample were aged from 40 to less than to 50 years, and (30%) of the sample were aged from 50 to less than 60 years , and (17%) of the sample were aged from 60 to less than 70 years, and (29%) of the sample their age 70 years and more.

Table (4.1): The repetitive distributions and percentage of the sample individuals based on Age

Age	Frequency	Percent%
less than 30 year	7	7
30 to less than 40 year	8	8
40 to less than 50 year	9	9
50 to less than 60 year	30	30
60 to less than 70 year	17	17
70 year and more	29	29
Total	100	100%

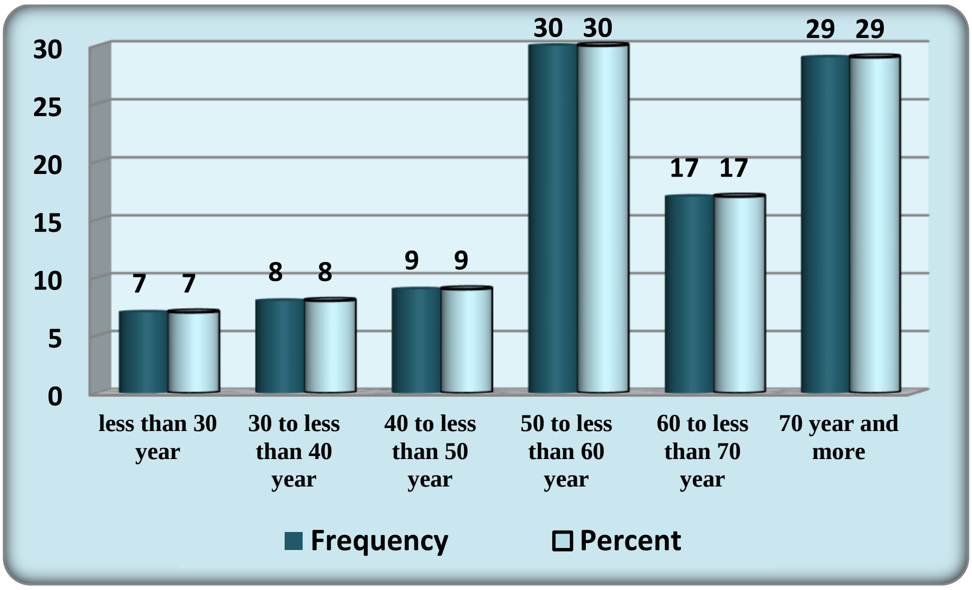

Figure (4.1) repetitive Distribution and percentage of sample individuals on the basis of Age

4.2. Distribution of sample individuals according to the gender:

The data set out in the table(4.2) regarding the distribution of the sample individuals on the basis of gender , indicate that the percentage of males represents 48% ,while as the females percentage represent 52% of the individuals participating in the study.

Table (4.2) repetitive distributions and percentage of the sample individuals according to gender.

Gender	Frequency	Percentage%
Male	48	48
Female	52	52
Total	100	100

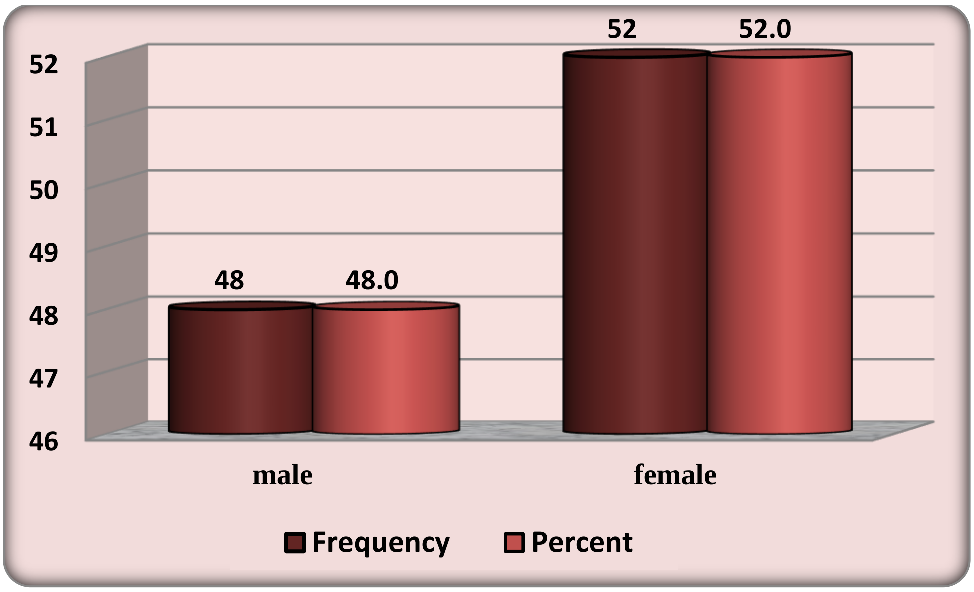

Figure (4.2) Repetitive Distribution and percentage of the sample individuals on the basis of Gender

4.3. Distribution of sample individuals according to the duration of diabetes:

From Table No. (4.3), it is clear that (24%) of the sample had diabetes less than 3 years ago, (30%) of them had diabetes for a period of 4 to 8 years, (22%) of the sample had diabetes for a period of 9 to 12 years, and (24%) of them had diabetes for a period of more than 12 years.

Table (4.3) repetitive distributions and percentage of the sample individuals according to duration of diabetes

Duration of diabetes	Frequency	Percentage%
less than 3 years	24	24
4 to 8 years	30	30
9 to 12 years	22	22
more than 12 years	24	24
Total	100	100

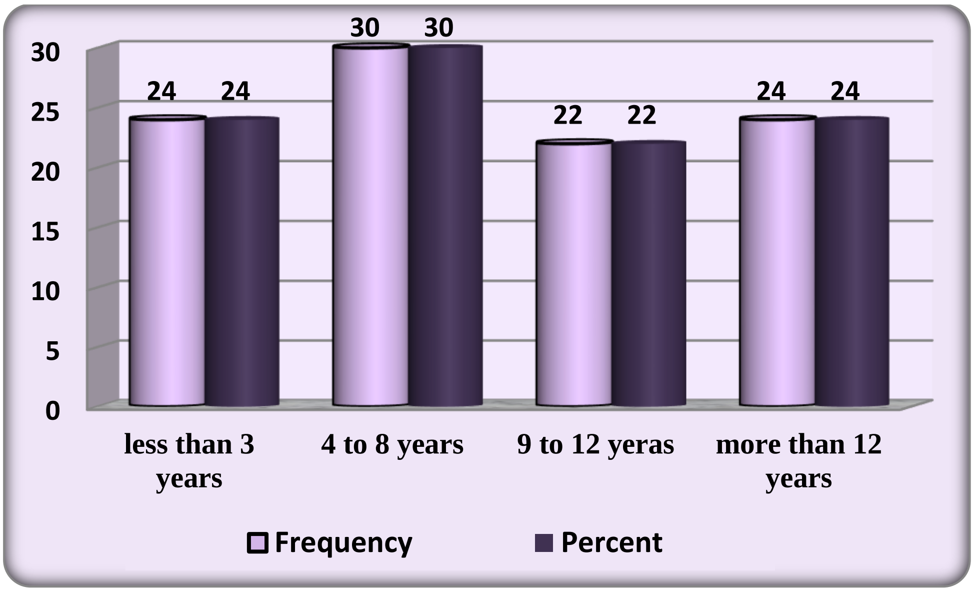

Figure (4.3) repetitive distributions and percentage of the sample individuals according to duration of diabetes

4.4 Distribution of the sample individuals according to the suffering from blood pressure:

From the table above (4.4), it is clear that (36%) of the sample suffer from blood pressure, while (64%) of them do not suffer from blood pressure.

Table (4.4) repetitive distributions and percentage of the sample individuals according to the suffering from blood pressure

Suffering from blood pressure	Frequency	Percentage%
has high blood pressure	36	36
doesn't have high blood pressure	64	64
Total	100	100

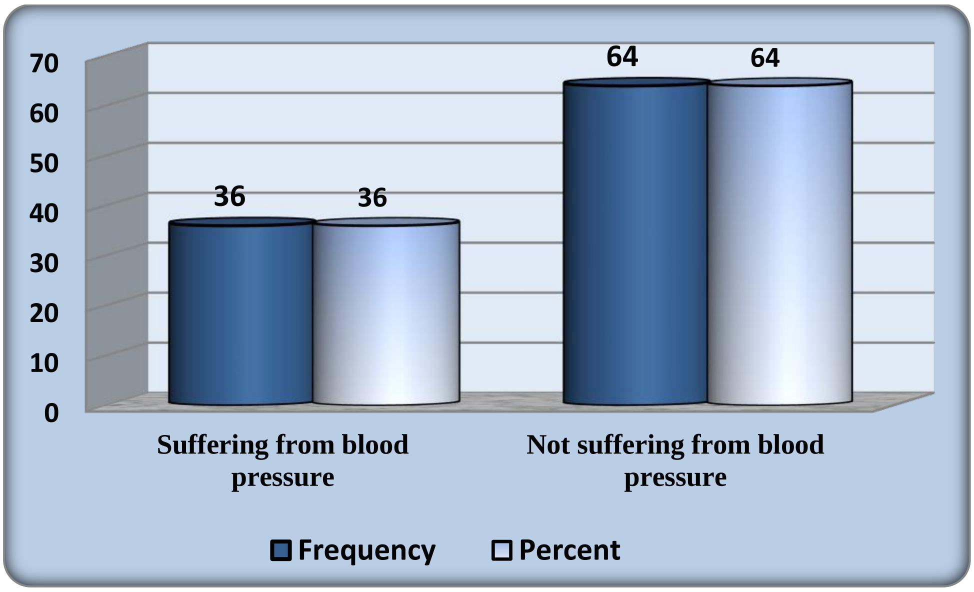

Figure (4.4) repetitive distributions and percentage of the sample individuals according to their suffering from blood pressure

4.5: Distribution of sample individuals according to Ca level:

From Table No (4.5)it was shown that the majority of the sample, (64%), had a normal calcium level, while (36%) had an abnormal calcium level.

Table (4.5) repetitive distributions and percentage of the sample individuals according to calcium level

calcium level	Frequency	Percentage%
Normal	64	64
Abnormal	36	36
Total	100	100

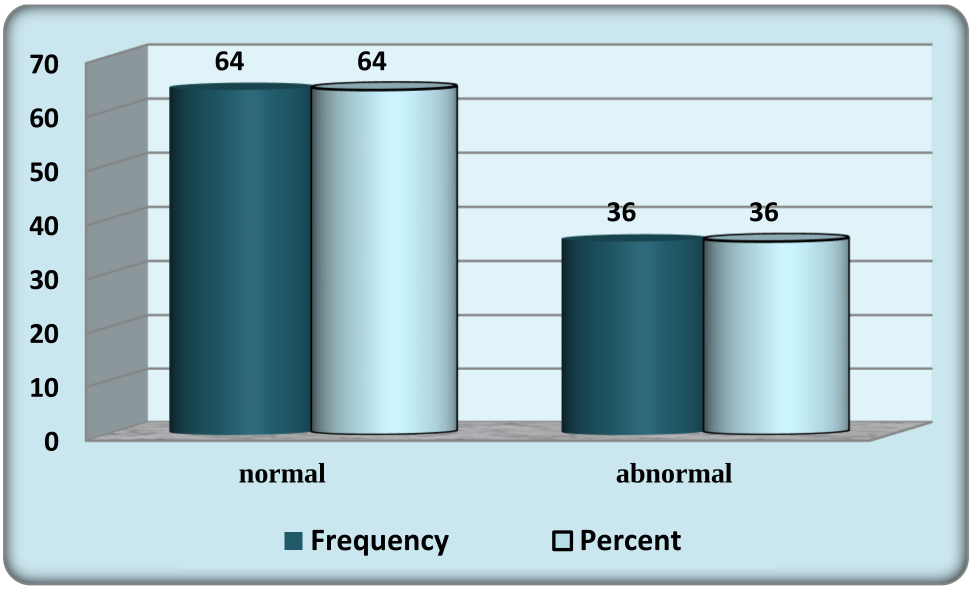

Figure (4.5) repetitive distributions and percentage of the sample individuals according to calcium level

4.6. The effect of Type of diabetes on calcium levels

Table 4.6: Results of Chi-square test to determine the effect of Diabetes Type on Calcium Levels The results showed that P-value was equal to 0.63, which was more than 0.05, that there was not a statistically significant relation between type of diabetes and calcium level, The Chi^2 calculated value (0.231), which was less than the tabular value (3.841), confirms this relation. This indicates that there is no effect of the type of diabetes on calcium.

Table 4.6. The Effect of Diabetes Type on Calcium Levels

			Calcium		Total	P-Value Sig.
			Normal	Abnormal		
Type of diabetes	Type 1	Frequency	17	8	25	0.63
		Percentage%	68%	32%	100.0%	
	Type 2	Frequency	47	28	75	
		Percentage%	62.7%	37.3%	100.0%	
Total		Frequency	64	36	100	
		Percentage%	64%	36%	100.0%	
Chi^2 Calculated = 0.231 , df=1 , Chi^2 Tabular 3.841						

Discussion:

This research, we collected 100 serum samples, consisting of 52% females and 48% males .their ages ranged from 20 to 90 years. The study also found that 71% of the participants did not follow a healthy diet, which may contribute to poor glycemic control and complications. Moreover, 57% of the patients relied on insulin injections as the main treatment method for managing their diabetes.

These findings highlight the importance of dietary education and lifestyle modification in diabetic care, as well as the need for regular monitoring of mineral levels to prevent metabolic complications.

The statistical analysis showed that the type of diabetes had no significant effect on calcium levels in the blood of diabetic patients, as the p-values 0.63 were greater than 0.05.
IN the Jordan, their study were concluded disagreement with our study, which they found The prevalence of hypophosphatemia among type 2 diabetic patients is high. Factors independently related to hypophosphatemia in diabetic patients: male gender, smoking, poor glycemic control, taking thiazides and not being on statin. (Dana .et.al 2022)
Also, IN Turkey study, The present findings suggest that lower serum magnesium levels were associated with higher HbA1c levels in subjects with T2DM.(Emine.et.al 2023)

Conclusion and recommendation:

This study focused on evaluating the impact of diabetes type on serum levels of calcium. It also examined patients' lifestyle habits, treatment methods, and dietary patterns to better understand the metabolic status of diabetic individuals and to support future health recommendation

The study showed that the majority of patients, 71%, did not adopt a healthy die also. In this research, 57% of patients rely on insulin injections to treat diabetes. However. The study showed that there was no effect of the type of diabetes on calcium levels, magnesium levels and phosphorus levels in diabetic patients, since p-value which were more than 0.05

5.2 Recommendation

Patents with diabetes should maintain calcium, magnesium, and phosphorus levels within the normal range due to their essential roles in various physiological processes. Furthermore, we recommend that future studies include a larger sample size in order to achieve stronger statistical significance and more reliable conclusions

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