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A pathochemical study to assess the level of vitamin B12 and magnesium in patients with type 1 and type 2 diabetes mellitus in Thi-Qar governorate.

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Abstract

Objective: In this research paper, we examine how treating patients with type 1 and type 2 diabetes with vitamin B12 and magnesium affects both insulin and non-insulin levels. The Glycated hemoglobin (HbA1c) marker, which is one of the fundamental and clinical markers to monitor in the control of type 2 diabetes mellitus patients (T2DM and type 1 diabetic mellitus), is also highlighted and discussed in this study. **Methods:** From February to March 2023, a cross-sectional study was done at the Medical Labs Research Center of Al-Hussein Teaching Hospital in Nasiriyah Governorate. Our research included 40 people with type 1 and type 2 diabetes. Before fasting, a physical examination, a thorough medical history, and blood samples were obtained. Following a 12-hour fast, all blood samples were collected. **Results:** Except for the B12 and Mg^{++} levels being significantly higher in DM1 patients in both the first and second age groups and the third age group of DM1 patients being significantly lower at p. value 0.05, we conclude from this study's two-way ANOVA test and t-test that cumulative sugar is unaffected by age or type of sugar.

Conclusions: Our findings indicate that both concentrations of B_{12} and Mg^{++} increased significantly in patients with DM_1 than DM_2 at p. value < 0.05. These findings call for more research on a wider population to look at the source of the deficit and the effectiveness of B12 supplementation in these patients.

Keywords: B12 screening, B12 supplementation, diabetics, HBA1C, Magnesium.

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1. Introduction:

Diabetes mellitus is regarded as an epidemiological condition linked to the rise in mortality and infection risks (1). The metabolic condition known as diabetes mellitus is characterized by a substantial rise in blood sugar that is brought on by a problem with the cells that generate insulin. This feature sets diabetes apart from other epidemiological diseases (2). One of the issues that poses a threat to human existence worldwide is diabetes, which affects the function of several body organs but has a particularly negative impact on the heart, kidneys, blood vessels, nerves, and other crucial bodily functions (3). Accurate and comparable to the cumulative glucose marker, which is regarded as strong evidence in preventing complications of diabetes, is one of the markers that have demonstrated efficacy in managing diabetes. Cumulative sugar does not impact the volatility of blood glucose levels after meals and other changes;

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hence the positivity of this marker is ascribed to the accurate and successful diagnosis of diabetes. short-term health issues (4). Vitamin B12 is one of the vital and essential components in maintaining sugar levels of both types of diabetes, as it is noted that vitamin B12 decreases with age and that this decrease harms the compliance processes and the exponential growth of gut bacteria. This research examined a study by measuring the level of parameters for each of vitamin B12, magnesium, and cumulative sugar among patients with type 1 and type 2 diabetes (5). There is a belief that low levels of magnesium cause an increase in the level of sugar in the blood, which is what causes deficiency and depletion in the level of magnesium in the blood, and this is what causes poor control. As a result. Based on glycemic control, several studies from other emerging and industrialized nations support this association between parameters and the diabetes population. This research aims to explore the relationship between cumulative glucose levels and magnesium. and vitamin B12 in patients with type 1 and type 2 diabetes (6).

2. Patients and Methods

Sample collection and testing:

This study was carried out in the medical laboratory research center of Al-Hussein Teaching Hospital in Al-Nasiriyah Governorate, where a cross-sectional study was carried out between February and March of 2023. Following the patients' signed agreement, personal and clinical data were collected for this study. They confirmed that they were fasting overnight. A venous blood sample of 5 mL was taken. Patients are being treated under rigorous aseptic settings. Magnesium and vitamin B12 levels were determined using serum samples. HbA1c was measured using an EDTA sample, and FBS and PPBS were measured using sodium fluoride serum samples. Blood samples were centrifuged at a low speed and the results were gathered. It is kept at -28 °C until it is used for testing. Magnesium levels were determined by utilizing Chromatography (Cobas 6000; Roche Mannheim Germany), and FBS, PPBS, and HbA1c were assayed. The values for FBS, PPBS, HbA1c, magnesium, and vitamin B12 were put into Excel sheets and saved.

STATISTICAL ANALYSIS

The data of this study was statistically analyzed by using SPSS version 26, based on using independent t-test, two-way ANOVA, LSD, and person for correlation at p. value < 0.05.

3. RESULTS

A comparison of HbA1c%, Level of B_{12} and Mg^{++} between DM_1 and DM_2 Patient

The present study noted the percentage of HbA1c was non-significantly increased in patients with DM_1 than in DM_2, in contrast, the results showed both concentrations of B_{12} and Mg^{++} increased significantly in patients with DM_1 than DM_2 at p. value < 0.05 as shown in table 1.

Effect of an Interaction between DM Type and Age on Biochemical Parameters

The current results recorded that HbA1c was not affected by the interaction of age and type of diabetes unlike the rest of the parameters, the B_{12}, and $\mathbf{Mg^{++}}$ were increased significantly in DM1 patients in both the first and second age groups, while the third age group of DM1 patients was decreased significantly at p. value < 0.05 as in table 2.

Person Correlation Between Biochemical in Patients with Diabetic

In patients with type 1 diabetes, the study showed a strong positive correlation between B12 and $\mathbf{Mg^{++}}$, while in patients with type 2 diabetes, the study noted a strong negative correlation between age and B12 as in Table 3.

Table 1: A comparison of HbA1c%, level of B_{12} and Mg^{++} between DM_1 and DM_2 Patients

Groups	DM_1 Patients No. 10	DM_2 Patients No. 10	p. value of t-test
	Mean ± SD		
HbA1c	8.99 ± 1.25	8.33 ± 1.94	0.376
B_{12}	243.0 ± 51.2	154.6 ± 38.3	< 0.001**
Mg^{++}	2.21 ± 0.32	1.85 ± 0.43	0.049*

Table 2: Effect of an interaction between DM type and age on biochemical parameters

Age Group	Type of Diabetic	HbA1c	B_{12}	Mg^{++}
		Mean ± SD		
35 – 44 years	DM_1	9.41 ± 1.25	246.8 ± 42.1[a]	2.30 ± 0.14[a]
	DM_2	6.60 ± 0.00	178.5 ± 0.00[b]	1.28 ± 0.00[c]
45 – 54 years	DM_1	8.20 ± 1.30	262.7 ± 58.6[a]	2.29 ± 0.25[a]
	DM_2	9.36 ± 2.24	141.1 ± 36.3[b]	1.66 ± 0.36[b]
55 – 66 years	DM_1	8.80 ± 0.00	161.4 ± 0.00[b]	1.42 ± 0.00[bc]
	DM_2	7.47 ± 0.94	165.4 ± 44.7[b]	2.23 ± 0.18[a]
p. value		0.301	0.007**	0.001**
LSD		Non-Sig	42.1	0.32

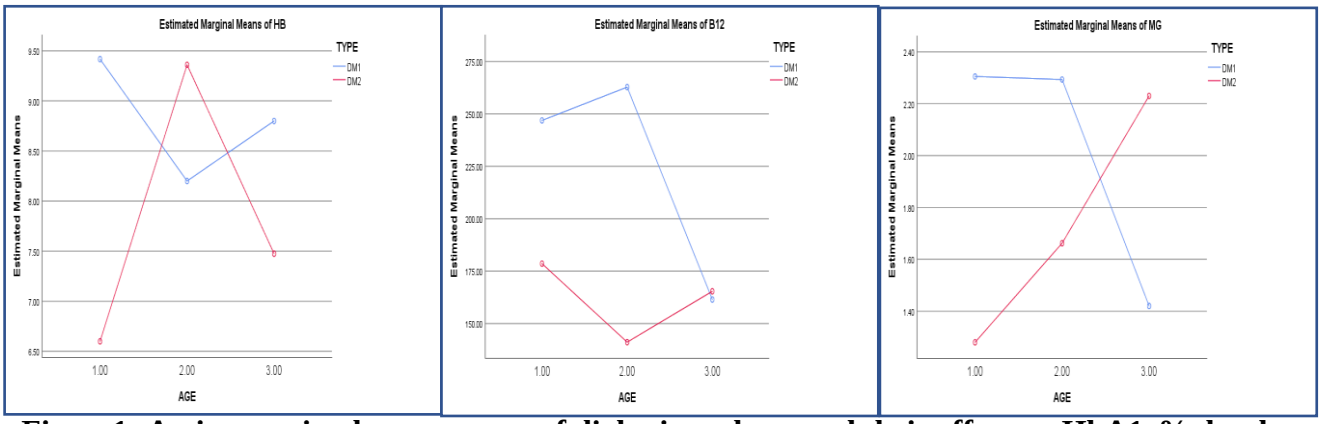

Figure1: An interaction between type of diabetic and age and their effect on HbA1c%, level of B_{12}, and Mg^{++}

Table 3: person correlation between Biochemical in Patients with Diabetic

Person		HbA1c	B12	Mg
Age	r	-0.262	-0.312	-0.626
	p. value	0.465	0.381	0.053
HbA1c	r		-0.128	-0.113
	p. value		0.724	0.755
B12	r	DM_1		0.723*
	p. value			0.018

Person		HbA1c	B12	Mg
Age	r	0.302	-0.694*	-0.490
	p. value	0.396	0.026	0.151
HbA1c	r		0.147	-0.476
	p. value		0.685	0.165
B12	r	DM_2		-0.135
	p. value			0.710

4. DISCUSSIONS

We infer from the clinical and biochemical of this research that there is a considerable increase in the concentration of vitamin B12 and magnesium electrolytes in patients with type 1 than in type 2 diabetes. Furthermore, age influences electrolyte levels at a significant level of P0.05, as this study included the association between cumulative glucose, magnesium, and vitamin B12 in diabetic patients. Hypomagnesemia is a common finding in patients with type 2 and type 1 diabetes mellitus. Serum magnesium levels were shown to be lower in patients with long-term diabetes and obese adults. Serum magnesium deficiency has been linked to poor glycemic control, as seen by higher FBS, PPBS, and HbA1c levels (7). Because hypomagnesemia and poor glycemic control are linked, it could suggest problems in diabetic individuals. It is recommended that diabetic patients have their serum magnesium levels and vitamin B12 levels evaluated regularly since a magnesium and vitamin B12 supplement may help improve glycemic control and stop or reduce the development of both microvascular and macrovascular issues (8).

Conclusion

Our findings indicate both concentrations of B_{12} and Mg^{++} increased significantly in patients with DM_1 than DM_2 at p. value < 0.05. These findings call for more research on a wider population to look at the source of the deficit and the effectiveness of B12 supplementation in these patients.

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Conflict of interest: There are no conflicts of interest.

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