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 Mg²⁺ 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 B₁₂ and Mg²⁺ increased significantly in patients with DM₁ than DM₂ 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.

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;
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 B₁₂ and
Mg^{++} between DM₁ and DM₂ Patient
The present study noted the percentage of HbA1c
was non-significantly increased in patients with
DM₁ than in DM₂, in contrast, the results showed
both concentrations of B₁₂ and Mg^{++} increased
significantly in patients with DM₁ than DM₂ 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 B₁₂,
and 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 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 B12 and Mg++ between DM1 and DM2 Patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>DM1 Patients No. 10</th>
<th>DM2 Patients No. 10</th>
<th>p. value of t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
<td>8.99 ± 1.25</td>
<td>8.33 ± 1.94</td>
<td>0.376</td>
</tr>
<tr>
<td>B12</td>
<td>243.0 ± 51.2</td>
<td>154.6 ± 38.3</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>Mg++</td>
<td>2.21 ± 0.32</td>
<td>1.85 ± 0.43</td>
<td>0.049*</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Type of Diabetic</th>
<th>HbA1c</th>
<th>B12</th>
<th>Mg++</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 – 44 years</td>
<td>DM1</td>
<td>9.41 ± 1.25</td>
<td>246.8 ± 42.1a</td>
<td>2.30 ± 0.14a</td>
</tr>
<tr>
<td></td>
<td>DM2</td>
<td>6.60 ± 0.00</td>
<td>178.5 ± 0.00b</td>
<td>1.28 ± 0.00c</td>
</tr>
<tr>
<td>45 – 54 years</td>
<td>DM1</td>
<td>8.20 ± 1.30</td>
<td>262.7 ± 58.6a</td>
<td>2.29 ± 0.25a</td>
</tr>
<tr>
<td></td>
<td>DM2</td>
<td>9.36 ± 2.24</td>
<td>141.1 ± 36.3b</td>
<td>1.66 ± 0.36b</td>
</tr>
<tr>
<td>55 – 66 years</td>
<td>DM1</td>
<td>8.80 ± 0.00</td>
<td>161.4 ± 0.00b</td>
<td>1.42 ± 0.00bc</td>
</tr>
<tr>
<td></td>
<td>DM2</td>
<td>7.47 ± 0.94</td>
<td>165.4 ± 44.7b</td>
<td>2.23 ± 0.18a</td>
</tr>
</tbody>
</table>

Table 3: person correlation between Biochemical in Patients with Diabetic

<table>
<thead>
<tr>
<th>Person</th>
<th>HbA1c</th>
<th>B12</th>
<th>Mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>r</td>
<td>-0.262</td>
<td>-0.312</td>
</tr>
<tr>
<td></td>
<td>p. value</td>
<td>0.465</td>
<td>0.381</td>
</tr>
<tr>
<td>HbA1c</td>
<td>r</td>
<td>-0.128</td>
<td>-0.113</td>
</tr>
<tr>
<td></td>
<td>p. value</td>
<td>0.724</td>
<td>0.755</td>
</tr>
<tr>
<td>B12</td>
<td>r</td>
<td>DM1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p. value</td>
<td></td>
<td>0.723*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person</th>
<th>HbA1c</th>
<th>B12</th>
<th>Mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>r</td>
<td>0.302</td>
<td>-0.694*</td>
</tr>
<tr>
<td></td>
<td>p. value</td>
<td>0.396</td>
<td>0.026</td>
</tr>
<tr>
<td>HbA1c</td>
<td>r</td>
<td>0.147</td>
<td>-0.476</td>
</tr>
<tr>
<td></td>
<td>p. value</td>
<td>0.685</td>
<td>0.165</td>
</tr>
<tr>
<td>B12</td>
<td>r</td>
<td>DM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p. value</td>
<td></td>
<td>-0.135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.710</td>
</tr>
</tbody>
</table>
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 P<0.05, 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 B12 and Mg** increased significantly in patients with DM1 than DM2 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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References


