Impact of Vitamin D Status on Irisin Hormone Level in Type 2 Diabetic Iraqi Women

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Abstract. Irisin, a hormone discovered in 2012, has gained attention for its potential role in regulating metabolism and promoting fat burning. This study was conducted on 180 women from Najaf Governorate/Iraq with T2DM who were divided into two main groups: the first group 90 T2DM with vitamin D deficiency and the second group 90 T2DM without vitamin D deficiency. Serum 25(OH)D and irisin levels were analyzed for the purpose of knowing the effect of vitamin D status on circulating irisin in relation to lipid profile and glycemic control in women with type 2 diabetes. The finding of the current study has been signified the effect of vitamin D deficiency may on serum irisin level in T2DM women. The vitamin D-deficient T2DM women had lower irisin levels than normal vitamin D T2DM women consistent with our hypothesis.

1 Introduction

Vitamin D deficiency is a prevalent health issue that can have significant impacts on our overall well-being [1]. It is important to understand the causes and consequences of vitamin D deficiency in order to effectively address this problem and promote better health outcomes [2]. One possible solution is to increase the intake of nutrient-rich foods and engage in regular exposure to sunlight, as these are natural sources of vitamin D [3]. Additionally, supplementation of vitamin D may be necessary for individuals who cannot meet their daily requirements through diet and sunlight alone [4]. The Irisin hormone has gained attention in recent years for its potential role in managing Type 2 diabetes. Research studies have suggested that irisin may play a role in improving insulin sensitivity, increasing glucose uptake in muscle cells, and promoting the browning of white adipose tissue [5]. These findings have sparked interest in exploring the therapeutic potential of irisin as a treatment option for Type 2 diabetes. However, further research is needed to fully understand the mechanisms of irisin and its effects on glucose metabolism in individuals with Type 2 diabetes. Additionally, clinical trials are necessary to determine the safety and efficacy of utilizing irisin as a therapeutic intervention for Type 2 diabetes [6].

Irisin may have positive effects on insulin sensitivity and glucose metabolism in individuals with Type 2 diabetes, more studies are needed to validate these findings and

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determine the safety and effectiveness of using irisin as a treatment option [7]. The role of irisin hormone in managing Type 2 diabetes is being studied, with initial research suggesting that it may have potential benefits for improving insulin sensitivity and glucose metabolism [8]. The study aimed to investigate the correlation between irisin, vitamin D, and lipid profile in Iraqi women with type 2 diabetes mellitus.

2 Materials and Methods

2.1 Ethical Consideration

It was approved by the Scientific Research Committee in the Najaf Health Department, in addition to the Scientific Research Ethics Committees in the College of Medicine at the University of Kufa.

2.2 Patients

The study was conducted from October 2021 to February 2022, a case control study was designed on one hundred eighty subjects. One hundred eighty T2DM patients including (90 T2DM females with vitamin D deficiency and 90 T2DM females without vitamin D deficiency) who attended the Center of Diabetes and Endocrinology in Al-Sadr Teaching Hospital in Najaf. - exclusion of subjects taking lipid lowering - The Participants aged (41-72) years. The patients were split into two groups in relation to the vitamin D deficiency: G1 implicates 90 type 2 diabetic women with vitamin D deficiency. G 2 implicates 90 type 2 diabetic women without vitamin D deficiency.

2.3 The inclusion criteria and exclusion criteria

The inclusion criteria: Type 2 diabetic women were diagnosed with diabetes on the basis of WHO criteria [9]. Both groups taking antidiabetic drugs. Exclusion criteria involve: Type 1 DM, Patients less than 40 years old, Those who are suffering from acute or chronic diseases such as, liver diseases, renal dysfunction, systemic or local infection, cancer, hypothyroidism, rheumatoid arthritis, and any diabetic complications, Subjects taking lipid lowering medication, and insulin and Smoking.

2.4 Determination of Serum Biochemical Indicators

The biochemical analyses lipid profile (TG, HDL, LDL), fasting plasma glucose and glycated hemoglobin (HbA1C) was estimated.

2.5 Statistical analysis

SPSS statistical package version 26 was utilized to conduct a data analysis. P-value less than 0.05 considered significantly [10].

3 Results

The results in the tables (1, 2 and 3). Group I: 90 patients with vitamin D deficiency and group II: 90 patients with normal vitamin D levels.
### Table 1. Serum levels of vitamin D and irisin in the two study groups.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>GI (n= 90)</th>
<th>GII (n= 90)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (Range)</td>
<td>12.0 (9.6 – 15.0)</td>
<td>49.4 (43.0 – 58.0)</td>
<td>0.001</td>
</tr>
<tr>
<td>Vitamin D (ng/ml)</td>
<td>6.3 (5.3 – 7.4)</td>
<td>7.0 (6.4 – 9.2)</td>
<td>0.015</td>
</tr>
</tbody>
</table>

### Table 2. Blood glucose and Glycated hemoglobin (HbA1c) values in the two study groups.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>GI (n= 90)</th>
<th>GII (n= 90)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBG (mg/dl) Mean ± SD</td>
<td>128.4 ± 13.4</td>
<td>122.6 ± 16.9</td>
<td>0.013</td>
</tr>
<tr>
<td>HbA1C (%) Median (Range)</td>
<td>8.0 (6.8 – 9.7)</td>
<td>7.5 (6.7 – 8.3)</td>
<td>0.030</td>
</tr>
</tbody>
</table>

### Table 3. Fasting lipid profile levels in the two study groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>GI (Deficient) (n=90)</th>
<th>GII (Normal) (n=90)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG (mg/dl)</td>
<td>145.5 (134.7 – 159.2)</td>
<td>134.0 (115.0 – 168.2)</td>
<td>0.036*</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>230.0 (205.7 – 245.0)</td>
<td>217.5 (201.7 – 239.0)</td>
<td>0.134</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>43.3 (40.7 – 45.3)</td>
<td>48.0 (45.7 – 52.0)</td>
<td>0.023*</td>
</tr>
<tr>
<td>VLDL (mg/dl)</td>
<td>29.1 (26.9 – 31.8)</td>
<td>25.1 (19.0 – 29.8)</td>
<td>0.039*</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>133.9 (114.2 – 149.9)</td>
<td>124.3 (103.9 – 146.6)</td>
<td>0.084</td>
</tr>
<tr>
<td>Cholesterol /HDL</td>
<td>3.5 (3.2 – 3.9)</td>
<td>3.3 (2.9 – 3.6)</td>
<td>0.018*</td>
</tr>
<tr>
<td>LDL/HDL</td>
<td>2.0 (1.7 – 2.4)</td>
<td>1.8 (1.5 – 2.2)</td>
<td>0.021*</td>
</tr>
<tr>
<td>TG/ HDL</td>
<td>2.2 (2.0 – 2.6)</td>
<td>2.0 (1.6 – 2.6)</td>
<td>0.027*</td>
</tr>
<tr>
<td>AIP</td>
<td>0.35 (0.29 – 0.43)</td>
<td>0.31 (0.22-0.42)</td>
<td>0.019*</td>
</tr>
</tbody>
</table>

GI (Diabetic patients with vitamin D deficiency), GII (Diabetic patients with normal vitamin D).

### 4 Discussion

#### 4.1 Impact of Vitamin D on serum Irisin

In this study, a significant increase in serum irisin level (P < 0.05) was observed in the sera of women with normal vitamin D compared to women with vitamin D deficiency. Furthermore, a positive relationship between irisin and vitamin D was observed in the natural vitamin group [11]. In addition, several published studies have indicated that vitamin D supplementation enhances blood irisin levels [12, 13, 14]. They concluded that the metabolic deterioration caused by vitamin D deficiency could be caused by a low level of irisin in laboratory animals (mouse, rat, and human irisin are 100% identical) [15]. However, previous studies provide contradictory results about blood irisin levels in T2DM patients [16]. Furthermore, Al-Daghari conducted a one-year intervention study on males...
and females who ate foods rich in vitamin D and were exposed to sunlight, along with regular physical activity. They found that irisin levels in males increased significantly over control, however, irisin levels in females remained unchanged [17].

4.2 Impact of irisin-vitamin D relationship on glycemic control

Irisin and vitamin D's effects on glycemic control have been studied recently [18]. Several studies have investigated the potential relationship between irisin and vitamin D levels and how they affect the control of blood sugar in individuals with diabetes [19, 20]. Though the findings are preliminary, early research suggests that irisin and vitamin D may work together to improve glycemic control and blood sugar regulation in diabetics [21, 22]. Further study is needed to fully understand the mechanisms behind the irisin-vitamin D relationship in glycemic control and any potential therapeutic implications [23]. Overall, research is currently being done on the relationship between irisin and vitamin D and how it impacts diabetics' capacity to control their blood sugar levels [24]. It is essential for medical professionals to stay up to date on the latest research and incorporate this information into their practice in order to optimize diabetes therapy [25, 26].

4.3 Impact of irisin-vitamin D relationship on lipid profile

Several studies have suggested that irisin may also have an impact on lipid profile, which refers to the levels of different types of fats in the blood [27, 28]. The irisin hormone has been a topic of interest in recent research due to its potential impact on lipid profile [29, 30]. Several studies have suggested that the irisin hormone may play a role in regulating lipid metabolism and potentially influencing the lipid profile of individuals. However, more research is needed to fully understand the mechanisms and effects of irisin on lipid profile [31, 32].

Irisin levels and lipid profiles in people with type 2 diabetes were examined in a study that was published in the journal "Diabetes & Vascular Disease Research" [33]. The results of the study showed that higher levels of irisin were associated with improved lipid profiles, which included lower levels of total cholesterol, LDL cholesterol, and triglycerides and higher levels of HDL cholesterol [34]. Irisin seems to enhance lipid profiles in type 2 diabetics, which may lower the risk of cardiovascular disease [35].

5 Conclusion

The finding of the current study has been signified the effect of vitamin D deficiency may on serum irisin level in T2DM women. The vitamin D-deficient T2DM women had lower irisin levels than normal vitamin D T2DM women consistent with our hypothesis.

References

9. HEARTS D: diagnosis and management of type 2 diabetes.


