Research Paper

Comparison of Serum Levels of Hormone Omentin-1 and Insulin Resistance Markers in Active-Obese, Inactive-Obese and Inactive Normal-Weight Men

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ABSTRACT

Background: Omentin-1 is an adipokine, mainly produced by visceral adipose tissue that improves insulin resistance.

Objective: This study compared the serum levels of omentin-1 and insulin resistance markers in active-obese, inactive-obese and inactive normal-weight men.

Method: In this cross-sectional study, 45 men (35.0±4.2 years, no symptoms of illness) were assigned to active-obese (n=16, Body Mass Index (BMI)=28.3-33.9 kg/m2 and 3-5 score in the Physical Activity level questionnaire (PA-R score), inactive-obese (n=18, BMI=28-33.9 kg/m2 and 1 in PA-R score) and inactive normal-weight (n=11, BMI=18.5-24.9 kg/m2 and 1 in PA-R score) groups. Blood samples were taken from all subjects in fasting state to measure the serum levels of omentin-1, insulin and glucose. Also, Homeostasis Model Assessment Index (HOMA-IR) for insulin resistance was assessed.

Finding: The results showed that the omentin-1 concentration was significantly lower in inactive normal-weight compared to the obese groups (P<0.05). In the active-obese group, the glucose, insulin concentrations and insulin resistance index were similar to the inactive normal-weight group; however, these values were significantly lower than the inactive-obese group (P<0.05). No significant difference was found between normal-inactive and obese-inactive groups for glucose concentration (P=0.079).

Conclusion: Based on these findings, it can be said that physical activity is more effective than obesity. Thus, the obese men can improve the negative effects of obesity on insulin resistance markers by performing physical activity and is not required to reduce the size of obesity.

Extended Abstract

1. Introduction

Obesity is associated with cardiovascular, kidney and lung diseases, type 2 diabetes and cancers [1]. Regular physical activity, in addition to weight control reduce the risk of such diseases [2]. Omentin-1 is an adipokine related to obesity; it plays a key role in controlling blood pressure, cardiovascular diseases and metabolic disorders [3]. The serum level of omentin-1 in inactive obese men is significantly higher than that of their healthy counterparts [4].

On the contrary, the plasma level of omentin-1 in obese men is lower than that of healthy weight men [5]. Nikseresht reported that insulin resistance index and insulin and glucose levels in obese men were significantly lower than their healthy counterparts [6]. Therefore, the serum level of omentin-1 in obese men was significantly lower than that of normal weight men [7].


Citation


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higher than those of lean men [6]. Khoo et al. argued that an exercise-induced weight loss program has been more effective in improving insulin resistance, compared to dieting alone [7]. The current study compared the serum level of omentin-1 and insulin resistance markers in active-obese, inactive-obese, and inactive healthy-weight men.

2. Methods and Materials

In this cross-sectional study, 45 healthy men were assigned into the following groups: 1. Active-obese (n=16, Body Mass Index (BMI)=28-33.9 kg/m², Physical Activity Rating (PA-R) scores=3-5); 2. Inactive-obese (n=18, BMI=28-33.9 kg/m², PA-R score=1), and inactive-healthy (n=11, BMI=18.5-24.9 kg/m², PA-R score=1) groups.

Fasting blood samples were obtained from all subjects to measure biochemical variables. Elisa test kits were used for measuring the concentrations of omentin-1 (EASTBIOPHARM, China) and insulin (Q-1-DIAPLUS, USA); for glucose, the glucose oxidase method (Glucose B-Test Kit, Wako Pure Chemical, Japan) was used. Furthermore, Homeostasis Model Assessment (HOMA-IR) was applied for measuring insulin resistance. Moreover, Beta cells (β-cells) function (%) was obtained according to the following formula:

\[
\text{Insulin resistance} = \frac{(\text{Fasting insulin in mIU/mL} \times \text{Fasting glucose in mmol/L})}{22.5}
\]

\[
\beta\text{-cell function} = \frac{(\text{Fasting insulin in mIU/mL} \times 20)}{(\text{Fasting glucose in mmol/L} - 3.5)}
\]

One-way Analysis of Variance (ANOVA), Kruskal-Wallis test, and Gabriel's post hoc test were used for analyzing the obtained data. The significance level was set at P<0.05.

3. Results

Kruskal-Wallis test results suggested that the concentration of omentin-1 in the inactive-healthy group was significantly lower, compared to the obese groups (Figure 1). One-way ANOVA results reported that insulin concentration and insulin resistance index in the active-obese group were similar to those of inactive-healthy group; these values were significantly lower than those of inactive-obese group. Glucose concentration was significantly lower than that of the inactive-obese group only in the active-obese group. Furthermore, the achieved results revealed no significant difference between the groups in terms of β-cell function (Table 1).

4. Conclusion

In the present study, the serum level of omentin-1 was higher in obese groups, compared to the controls. Contrary to this finding, Ouerghi et al. reported that the plasma level of omentin-1 in obese men is lower than that of healthy weight men [5]. This inconsistency may be because of the difference in the age of studied subjects. In their study, the mean age of subjects was 18 years which is considerably lower that of the present study subjects. Moreover, according to de Souza et al. the serum level of omentin-1 in lean subjects was higher than that of overweight and obese samples [10]. In their study, age (24-73 y) and BMI (21-66 kg/m²) of the subjects were higher, compared to our study; this could explain the existing inconsistency.

### Table 1. The anthropometric characteristics of study groups (Mean±SD)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Inactive Normal Men (n=11)</th>
<th>Inactive Obese Men (n=18)</th>
<th>Active Obese Men (n=16)</th>
<th>ANOVA P-value</th>
<th>Gabriel's Post Hoc Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>33.6±3.2</td>
<td>36.3±5.2</td>
<td>34.4±3.9</td>
<td>0.314</td>
<td>-</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>68.8±8.9</td>
<td>94.8±8.5</td>
<td>87.4±8</td>
<td>0.0006*</td>
<td>0.0007* 0.0009* 0.097</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>21.9±2</td>
<td>30.6±1.9</td>
<td>29.1±2.6</td>
<td>0.0001*</td>
<td>0.0001* 0.0004* 0.282</td>
</tr>
<tr>
<td>Glucose, mmol/L</td>
<td>5.4±0.65</td>
<td>5.9±0.42</td>
<td>5.4±0.28</td>
<td>0.003*</td>
<td>0.079 0.835 0.0001*</td>
</tr>
<tr>
<td>Insulin, mIU/mL</td>
<td>5.4±1.5</td>
<td>8.1±2.1</td>
<td>4.6±1.9</td>
<td>0.0001*</td>
<td>0.003* 0.707 0.0004*</td>
</tr>
<tr>
<td>Insulin resistance index</td>
<td>1.34±0.51</td>
<td>2.13±0.54</td>
<td>1.12±0.44</td>
<td>0.0003*</td>
<td>0.001* 0.607 0.0007*</td>
</tr>
<tr>
<td>(%) β-cell function</td>
<td>58.3±7.5</td>
<td>68.4±24.5</td>
<td>51.4±28</td>
<td>0.137</td>
<td>-</td>
</tr>
</tbody>
</table>

P_1: Difference between inactive normal and inactive obese groups; P_2: Difference between inactive normal and active obese groups; P_3: Difference between inactive obese and active obese groups; *P<0.05
The current study reported that insulin concentration and insulin resistance index in the active-obese group were similar to those of inactive-healthy group. Moreover, these indices were significantly lower than those of the inactive-obese group. This result is consistent with the findings of Ouerghi et al. and Nikseresht who reported that the serum level of insulin in inactive obese men was significantly higher than lean men [5, 6]. Moreover, Kadoglou et al. concluded that insulin resistance index in active patients was significantly lower than that of inactive patients [11].

In our study, glucose concentration in the active-obese and inactive-healthy groups was also similar; it was significantly lower than the inactive-obese group only in the active-obese group. Consistent with this result, Nikseresht [6] suggested that the serum level of glucose in inactive obese men was significantly higher than that of lean men. Overall, based on the current study, physical activity improves the status of insulin resistance markers without reducing obesity.

Ethical Considerations

Compliance with ethical guidelines

This study was registered with ethics code 36ECRIES and IRCT2012120411670N1 at the Clinical Trials Center Iran.

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Authors’ contributions

Conceptualization, methodology, resources, writing-review, editing, supervision: Mahmoud Nikseresht; Writing original draft: Saeed Khosravi-Nejad; and Investigation: Mahmoud Nikseresht, Saeed Khosravi-Nejad.

Conflict of interest

The authors declared no conflict of interest.

Figure 1. Omentin-1 serum level (Pg/mL) in the study groups

* Significant difference compared to other groups.

مقایسه سطح سرمی هورمون (متین) - 1 و نشانگان مقاومت به انسولین در مردان چاق فعلی، چاق غیرفعال و نرمال غیرفعال

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1-مدت‌نامه‌های دیاتوکاینی است که به‌طور چرخه‌ای اعماله شده و موجب بهبود حساسیت سرمی‌هورمون می‌شود.

هدف این مطالعه مقایسه سطح سرمی‌هورمون (متین) - 1 و نشانگان مقاومت به انسولین در مردان چاق فعلی، چاق غیرفعال و نرمال غیرفعال بود.

میانگین سن دانشجویان در گروه‌های چاق فعلی 35/0±4/2 کیلوگرم بر مترمربع و اردم غیرفعال بود.

نفر، شاخص توده بدن -24/9 و نرمال غیرفعال -24/9

نفر، شاخص توده بدن -11/9 و گلوکز و انسولین در جنگلیت بدنی.

نفر، شاخص مقاومت به انسولین مشابه با گروه نرمال غیرفعال بود.

نتایج نشان داد غلظت امنتین یافته ها در گروه چاق فعلی بر اساس آزمون تاندیرک همانند با گروه چاق غیرفعال بود.

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