INTRODUCTION

Hirsutism is the presence of excessive terminal hair in an androgen-dependent and male pattern of distribution in females. Hirsutism is a common disorder that affects between 5% and 10% of women of reproductive age. The hirsute female’s quality of life can be severely impacted, with impairing of feminine identity self-image. This excessive growth of hair may result from an increase in either circulating androgen or the sensitivity of the pilosebaceous unit to a normal serum level of androgen or a combination of both factors. Polycystic ovarian syndrome (PCOS) disease is a common cause of hirsutism and can begin at puberty with gradual worsening with age. Omentin-1 (also known as intelectin-1, intestinal lactoferrin receptor, galactofuranose-binding lectin, endothelial lectin HL-1) is a major visceral fat secretory adipokine that is secreted by omental adipose tissue and much less in the intestines, lung, and heart, expressed in human ovarian follicles and more particularly in granulosa cells.
1.1 | Aim of the study

The aim of this work was to evaluate the serum level of omentin-1 in PCOS patients with hirsutism.

2 | PATIENTS AND METHODS

2.1 | Ethical approval

Before proceeding with this study, an approval was obtained from the Research Ethics Committee in Faculty of Medicine, Benha University. The participants had given their informed consent and were not subjected to any harmful procedures.

This study was a case-control comparative study done in Dermatology & Andrology, Clinical Pathology and Gynecology & Obstetrics Departments in the period from June 2017 to January 2018.

This study included eighty-five females recruited from the Laser Unit in Dermatology & Andrology Department. They were divided into two groups. The first group included sixty females suffering from hirsutism, and the second group included twenty-five apparently normal females. The hirsutism group was subdivided into two subgroups: Group A included thirty females suffering from hirsutism with PCOS, while Group B included thirty females suffering from idiopathic hirsutism. Pregnant or lactating females or those with disorders of liver, kidney, thyroid, or adrenal were not included in the study. Also, cachectic or women under dietary regimen for the last 3 months were all excluded from this study. History was taken from all the participants with emphasis on puberty onset, menstrual cycle duration and regularity, previous gynecological treatments, family history of PCOS, body hair distribution, frequency of hair removal and hirsutism duration and course if present. Body mass index (BMI) kg/m² and blood pressure were measured. Complete dermatological examination was done with attention to any sign of hyperandrogenism such as female pattern hair loss, acne, seborrhea, and distribution of terminal hair.

The diagnosis of hirsutism was done clinically, and severity was categorized according to modified Ferriman-Gallwey scoring system.

A gynecological examination was done by pelvi-abdominal sonography in all subjects either trans-abdominally (virgin females) or trans-vaginally (nonvirgin females). The ovarian morphology was carefully visualized and examined for oocyte follicles presence, count, and size.

The diagnosis of PCOS was based on Rotterdam criteria in which two of the following three features were sufficient for diagnosis: (a) oligoovulation and/or anovulation, (b) clinical and/or biochemical signs of hyperandrogenism, and (c) polycystic ovaries on ultrasound examination (the presence of 12 or more follicles measuring 2-9 mm in diameter and/or ovarian volume >10 cm³).

2.2 | Laboratory investigation

In the morning, 5 mm venous blood samples were collected from each participant under complete aseptic conditions from the 2nd to the fifth day of the menstrual cycle. Blood was allowed to clot then centrifuged at 480 g for 10 minutes to separate the serum. The separated serum was preserved at -20°C until the time of the run.

Measurement of serum omentin-1 and total testosterone were done by enzyme-linked immunosorbent assay using available kits (R&D Systems for omentin-1 and Chemux Bioscience for total testosterone).

2.3 | Statistical analysis

The t test was used to compare the numerical data of normally distributed variables, and analysis of variance (ANOVA) test was used.
to compare more than two groups, while categorical variables differences were analyzed with $\chi^2$ (chi-square) test. Spearman correlation was used to examine correlations. If the $P$-values were $\leq 0.05$, it was considered significant. The statistical analysis was done using the SPSS® program version 17 for Microsoft Window 7®.

### RESULTS

This study included eighty-five females with age range from 21 to 39 years. Their clinical and laboratory data are summarized in Table 1.

Results of this study showed nonsignificant differences between the groups of females included in this study regarding their mean age or BMI ($P > 0.05$). There was no significant difference between hirsute females with PCOS and females with idiopathic hirsutism regarding grade of hirsutism ($P = 0.289$, Table 2). Family history of hirsutism was significantly noted in hirsute females with PCOS and with idiopathic hirsutism more than control group ($P = 0.0068$, 0.0018, respectively, Table 2).

Hirsute females with PCOS suffered from more menstrual cycle irregularity than idiopathic hirsutism females and control with significant differences ($P = 0.0005$, <0.00001, respectively, Table 2). In addition, hirsute females with PCOS suffered from acne and seborrhea than control with significant differences ($P = 0.043$, 0.0002, respectively). Results of this study showed that females with idiopathic hirsutism suffered from seborrhea and female pattern hair loss (FPHL) than controls with a significant difference ($P = 0.015$, 0.0128, respectively, Table 2).

Regarding laboratory data, serum omentin-1 level was significantly elevated in females with idiopathic hirsutism than hirsute females with PCOS ($P < 0.0001$) and control ($P = 0.001$, Table 2). Furthermore, serum omentin-1 was significantly decreased in hirsute females with PCOS than control ($P = 0.003$, Table 2).

Results of this study showed elevated serum testosterone level in hirsute females with PCOS than females with idiopathic hirsutism ($P < 0.001$) and controls ($P < 0.001$, Table 2), although there was nonsignificant difference found between females with idiopathic hirsutism and control regarding serum testosterone level ($P = 0.072$, Table 2).

Results of this study showed a statistically significant inverse correlation between serum testosterone and omentin-1 in hirsutism group ($P < 0.001$, Table 3).

### DISCUSSION

Hirsutism is due to an interaction between androgen and androgen receptors of the hair follicle; however, its severity does not depend on serum androgen concentration. Both PCOS and idiopathic hirsutism are the most common causes of this condition. Hirsutism not only is a cosmetic problem, but also affects patient’s quality of life and can be accompanied by severe anxiety and depression. The aim of our study was to evaluate serum level of omentin-1 in hirsute females with PCOS and idiopathic cause. Participants and controls were age

### TABLE 2 Comparison between subgroups regarding clinical and laboratory data

<table>
<thead>
<tr>
<th>Group comparison</th>
<th>Hirsutism with PCOS vs Idiopathic hirsutism</th>
<th>Hirsutism with PCOS vs Control</th>
<th>Idiopathic hirsutism vs Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test value</td>
<td>$P$ value</td>
<td>Test value</td>
</tr>
<tr>
<td>Age</td>
<td>0.297</td>
<td>0.767</td>
<td>1.33</td>
</tr>
<tr>
<td>BMI</td>
<td>1.1</td>
<td>0.275</td>
<td>1.83</td>
</tr>
<tr>
<td>Menstrual irregularity</td>
<td>12.27</td>
<td>0.0005</td>
<td>12.55</td>
</tr>
<tr>
<td>History of chronic acne</td>
<td>0.278</td>
<td>0.598</td>
<td>4.07</td>
</tr>
<tr>
<td>Seborrhea</td>
<td>2.44</td>
<td>0.118</td>
<td>14.23</td>
</tr>
<tr>
<td>FPHL</td>
<td>0.88</td>
<td>0.347</td>
<td>3.14</td>
</tr>
<tr>
<td>Family history</td>
<td>0.29</td>
<td>0.592</td>
<td>7.33</td>
</tr>
<tr>
<td>Omentin-1 (ng/mL)</td>
<td>9.65</td>
<td>&lt;0.0001</td>
<td>3.17</td>
</tr>
<tr>
<td>Testosterone (ng/mL)</td>
<td>1.07</td>
<td>&lt;0.001</td>
<td>4.45</td>
</tr>
<tr>
<td>Grade of hirsutism</td>
<td>1.17</td>
<td>0.289</td>
<td></td>
</tr>
</tbody>
</table>

Note: Data are presented by mean ± SD. The t test was used to compare the numerical data of normally distributed variables, while categorical variables differences were analyzed with $\chi^2$ (chi-square) test.

### TABLE 3 Correlations of both serum omentin-1 and testosterone levels with other variants in hirsutism group

<table>
<thead>
<tr>
<th></th>
<th>Omentin-1</th>
<th>$P$ value</th>
<th>Testosterone</th>
<th>$r$</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.126</td>
<td>0.337</td>
<td>0.167</td>
<td>0.201</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>−0.156</td>
<td>0.235</td>
<td>0.106</td>
<td>0.421</td>
<td></td>
</tr>
<tr>
<td>Grade of hirsutism</td>
<td>0.17</td>
<td>0.195</td>
<td>0.241</td>
<td>0.063</td>
<td></td>
</tr>
<tr>
<td>Testosterone</td>
<td>−0.553</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $P \leq 0.05$ is significant; $P > 0.05$ is nonsignificant.

Abbreviations: BMI, body mass index; r, Pearson correlation coefficient.
and BMI matched. This selection was to exclude the effect of obesity on serum level of both testosterone and omentin-1. Results of our study showed that hirsute females had signs of hyperandrogenism more than controls, which is due to either elevation of or hypersensitivity to serum testosterone. Serum level of omentin-1 was elevated in females with idiopathic hirsutism than other groups. This elevation may indicate a possible role of omentin-1 in hair growth.

Omentin-1 has a protective role in prevention of atherosclerosis and can induce blood vessel dilation. The exact role of omentin-1 on hair growth is currently unknown. However, omentin-1 can stimulate hair growth through two possible pathways either as a vasodilator inducer or through activation of phosphatidylinositol 3-kinase (PI3K) downstream effect. Both vascular vasodilation and PI13K have roles in stimulation of hair growth.

Results of this present study showed elevation of serum testosterone level in hirsute females than control. Serum level of testosterone was elevated in hirsute females included in this study more than other groups. Testosterone has an essential role in hirsutism, and the excess androgen or hypersensitivity to androgen can induce terminal hair overgrowth in androgen-sensitive sites and development of hirsutism.

The results of this study showed presence of family history in hirsute females. This may be explained by the role of genetic predisposition and similar ethnicity of females involved in this study.

Results of the present study showed an inverse correlation between serum testosterone level and omentin-1 in hirsute females. Increase of serum testosterone may precipitate atherosclerosis and metabolic syndrome occurs in female PCOS, but omentin-1 has an anti-atherosclerosis action and its serum level is decreased in diseases characterized by atherosclerotic changes as metabolic syndrome and cardiovascular disease.

5 | CONCLUSIONS

Serum omentin-1 is elevated in females suffering from idiopathic hirsutism, and this elevation may have a role in hair overgrowth. Testosterone has an inverse correlation with omentin-1. Hirsutism may have familial inheritance.

6 | LIMITATIONS

This study included PCOS and idiopathic hirsutism cases only.

CONFLICT OF INTEREST

There are no conflicts of interest.

AUTHORS’ CONTRIBUTION

All authors conceived and designed the study, analyzed the data, and interpreted the data. All authors drafted the article and revised the article for important intellectual content. All authors approved the final version of the article.

ORCID

Essam M. Aki https://orcid.org/0000-0002-9579-1727

REFERENCES


How to cite this article: Kenawi MZ, Akl EM, Sabry JH, Mostafa ST. Evaluation of serum level of omentin-1 in females with hirsutism. J Cosmet Dermatol. 2019;00:1-5.
https://doi.org/10.1111/jocd.13043