Study of Serum Leptin and Lipid Profile Concentration in Psoriatic Patients in Hilla - Iraq

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Abstract

Background: To study the role of biochemical markers in sera of psoriatic patients. Aim: Evaluation and study of the correlation between lipid profiles and Leptin in sera of psoriatic patients in Hilla province – Iraq.

Patients and Methods: The study was conducted on sixty psoriatic patients and thirty apparently healthy persons were taken as control group. Blood collected from the clinic of dermatology in Merjan Teaching Hospital and from the consultative center for allergy and asthma in Hilla city / Iraq. Sera obtained from the blood were used to determine the effect of psoriasis on leptin, total cholesterol, high density lipoprotein (HDL-C), triglycerides (TGs), very low density lipoprotein (VLDL), and low density lipoprotein cholesterol (LDL-C) concentration.

Results and Discussion: The results of the present study showed (significant increase in leptin, total cholesterol, triglycerides, very low density lipoprotein and low density lipoprotein cholesterol concentration), significant decrease in high density lipoprotein cholesterol in sera of psoriasis group compared to control group, significant increase in leptin concentration in sera of psoriasis females than males, significant increase in leptin concentration in sera of psoriasis patients as increase BMI (body mass index).

Introduction

Psoriasis is a common chronic, immune-mediated, inflammatory disease of the skin (1). It is relapsing, non-contagious disorder characterized by red patchy lesions, with grey or silvery-white, dry scales (2).

Lesions are typically distributed symmetrically on the scalp, elbows, knees and essentially any part of the body. It is a disease with an unpredictable course, prone for flare-
ups and remissions and can affect the joints and nails (3).

Psoriasis is generally categorised into one of three severities based on the extent of body surface covered. Where 2% of the body is affected, it is classified as mild, where 3-10% of the body is covered, it is classified as moderate and where more than 10% of the body is affected, the disease is classified as severe. Based on these criteria, approximately 25-30% patients have psoriasis, which is considered moderate to severe (4).

It can afflict both men and women, and usually begins in early adulthood although it has been reported at birth. There is a bimodal distribution in the age of onset. Type I or early onset psoriasis typically appears in individuals between ages 15 to 20 years and shows a tendency to disseminate, greater number of relapses, and higher frequency of familiar history of psoriasis when compared with Type II or late onset psoriasis during or after the fifth decade of life (5, 6, 7).

Psoriasis is distributed worldwide but its prevalence varies among different geographical areas and ethnic groups (8). In Iraq, approximately 2.3% of the population is affected (9). The immune system has been strongly implicated in the pathogenesis of psoriasis that resembles a T cell-mediated disease (10). T cells are found in the dermis and epidermis and are accompanied by increased numbers of dermal dendritic cells, macrophages and mast cells (11).

Several environmental factors are recognised as triggers and exacerbators for psoriasis among which: infections (12), alcohol and smoking (13), family history (genetics) (14), trauma (15), stress (16), drugs (17) and diet (18).

Clinical types of psoriasis can be classified according to phenotype-based classification that intended for use in both clinical practice and researches (19): plaque psoriasis, guttate (Eruptive) psoriasis, generalized pustular psoriasis, palmoplantar pustular psoriasis, psoriatic arthropathy, erythrodermic psoriasis, scalp psoriasis, nail psoriasis.

Leptin is a 16 kD (kilo Dalton) protein hormone. The primary amino acid sequence indicated that leptin may adopt a helical cytokine structure similar to interleukin-2 (IL-2) and growth hormone, and this led to the early indication that its receptor might be a member of the hemopoietin receptor family (20).

Human leptin is a protein of 167 amino acids. It is manufactured primarily in the adipocytes of white adipose tissue, and the level of circulating leptin is directly proportional to the total amount of fat in the body. White adipose tissue is the major source of leptin in addition to it can also be produced by brown adipose tissue, placenta, ovaries, skeletal muscle, stomach (lower part of fundic glands), mammary epithelial cells, bone marrow, pituitary gland, liver and gastric chief cells (21, 22).

Leptin plays a key role in regulating energy intake and energy expenditure, appetite and metabolism. Leptin acts on receptors in the hypothalamus of the brain, it works by inhibiting the activity of neurons that contain neuropeptide Y (NPY) and agouti-related peptide (AgRP), and by increasing the activity of neurons expressing α-melanocyte-stimulating hormone (α-MSH) (23, 24).

Leptin promote angiogenesis by increasing vascular endothelial growth factor (VEGF) levels. In some epidemiological studies, hyperleptinemia is considered as a risk factor for atherosclerosis (25, 26).

The major lipids present in the plasma are fatty acids, TGs, cholesterol and phospholipids, are all transported...
Materials and Methods

Materials

Subjects

The study was conducted over a period of eleven months from October 2010 till August 2011. Samples collected from clinic of dermatology in Merjan Teaching Hospital and consultative center for allergy and asthma in Hilla-Iraq. The practical side of the study was performed at the laboratory of biochemistry department in College of Medicine/Babylon University.

This study included sixty psoriatic patients and forty healthy were taken as control group. A questionnaire was designed to obtain the information from psoriasis patients and control group. It contained the name, age, weight, height and smoking.

The general criteria for all subjects in this study included not those suffering from any disease (e.g. hypertension, diabetes mellitus, asthma etc.), not given any medication (e.g. methotrexate, diuretics, steroid, etc.) for at least one month, not drinking alcohol, not smoking and not pregnant women. Subjects that had these criteria were excluded from this study.

The psoriasis group comprised sixty adults (27 men and 33 women), aged 18-77 year with mean ± SD of 46.18 ± 15.23year. All patients had not received any treatment for psoriasis for at least one month prior to blood collection and not received any medication for other diseases. The control group includes forty apparently healthy individuals (18 men and 22 women) aged 16-76 year with mean ± SD 43.43 ± 18.6 year.

Blood Sampling:

Venous blood samples were drawn from psoriasis and control subjects by using disposable syringes (5mL) in the sitting position. Five mls of blood were obtained from each subject by vein puncture and pushed slowly into plain disposable tubes. Blood was allowed to clot at 37˚C for 10-15 minutes, and then centrifuged at 1800 Xg for approximately 10-15 minutes then the sera were obtained and stored at -20˚C until analysis (measure leptin, total cholesterol, HDL-C, TGs, VLDL and LDL-C).

Methods

Serum leptin concentration was determined by Mediagnost (Germany) kit. Serum total cholesterol, triglycerides and HDL-C concentration were determined by Biolabo SA (France) kit. VLDL-C concentration was calculated by dividing triglycerides value by 2.22 (28). LDL-C concentration was calculated by using Friedewald equation (29).

Results

Total cholesterol, HDL-C, TG, VLDL and LDL-C concentration were measured in sera of sixty psoriatic patients and thirty healthy (control group) as shown in table (1). The results in table (1) show significant increase in (total cholesterol, triglycerides, VLDL and LDL-C concentration), significant decrease in HDL-C concentration in sera psoriasis group compared with those of the control group.

Leptin concentration were measured in sera of sixty psoriatic patients and thirty healthy (control group) as shown in table (2). Also this study showed significant increase in leptin concentration in sera.
of psoriasis group compared with those of the control group, significant increase in leptin concentration in sera of males in psoriasis group compared to those of control group.

Table 1: Serum total cholesterol, HDL-C, TG, VLDL and LDL-C concentration in psoriasis and control group. (P-value of < 0.05 was considered to be statistically significant)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Subjects</th>
<th>No.</th>
<th>Mean ± SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total-Cholesterol (mmol/L)</td>
<td>Psoriasis group</td>
<td>60</td>
<td>5.38 ± 0.88</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>40</td>
<td>4.58 ± 0.83</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>HDL-C (mmol/L)</td>
<td>Psoriasis group</td>
<td>60</td>
<td>1.1 ± 0.28</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>40</td>
<td>1.48 ± 0.44</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>Psoriasis group</td>
<td>60</td>
<td>1.61 ± 0.91</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>40</td>
<td>1.05 ± 0.93</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>VLDL-Cholesterol (mmol/L)</td>
<td>Psoriasis group</td>
<td>60</td>
<td>0.72 ± 0.41</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>40</td>
<td>0.47 ± 0.24</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>LDL-C (mmol/L)</td>
<td>Psoriasis group</td>
<td>60</td>
<td>3.43 ± 0.93</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td>40</td>
<td>2.73 ± 0.94</td>
<td>P&lt; 0.001</td>
</tr>
</tbody>
</table>

Table 2: Serum leptin concentration in psoriasis and control group. (P-value of < 0.05 was considered to be statistically significant)

<table>
<thead>
<tr>
<th>Leptin (ng /ml)</th>
<th>Subjects</th>
<th>No.</th>
<th>Mean ± SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Psoriasis group , male</td>
<td>27</td>
<td>11.25 ± 2.57</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Psoriasis group , female</td>
<td>33</td>
<td>16.07± 2.82</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group , male</td>
<td>18</td>
<td>5.7± 1.09</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Control group , female</td>
<td>22</td>
<td>10.76± 2.1</td>
<td>P&lt; 0.001</td>
</tr>
</tbody>
</table>

Significant increase in leptin concentration also found in sera of females in psoriasis group compared to males of the same group, also significant increase in leptin concentration found in sera of females in control group compared to males of the same group.

Discussion

Leptin:
One of the major findings of the present study was the significant increase in serum leptin concentration observed in psoriasis group compared
to the control group. The results of the present study were in agreement with Amira et al. (30) study in which they found people with psoriasis to have higher levels of the obesity-related hormone (leptin) than those without psoriasis and disagree with Aktan, et al. (31) study in which they found there was non significant difference between serum leptin levels of psoriasis and control group.

There are two possible mechanisms by which plasma leptin level increased in psoriatic patients:

**First** mechanism plasma leptin levels are strongly correlated with adiposity. Tissue adiposity along with gender is the main determinant of leptin gene expression and release (32).

**Second** mechanism is inflammation process, the proinflammatory mediators in psoriasis stimulate leptin expression, which eventually leads to metabolic dysregulation. Different inflammatory stimuli, including IL-1, IL-6, and lipopolysaccharides, regulate leptin messenger RNA expression and circulating leptin levels (33).

Studies have been performed to investigate the possible role of tissue leptin levels in the pathogenesis of psoriasis. This can be explained in view of previous studies Bernotiene et al (34) that showed the leptin modulates T-helper cell activity. In those studies leptin was found to activate monocytes and macrophages, potentiating the production of various proinflammatory cytokines TNF-α, IL-6 (Interleukin) and directing T-cell differentiation to Th1 phenotype (35).

Leptin has been shown to stimulate keratinocyte proliferation, expression of adhesion molecules and angiogenesis which is characteristic for psoriasis (36).

There are several causes lead to significant increase in serum leptin levels in women than in men for both psoriasis and control group:

**First:** Women in general have more body fat than men and different fat distribution. The serum leptin concentration is closely positively related to fat mass. Women have more subcutaneous fat than visceral fat, while the opposite condition is present in men. It has been shown that subcutaneous fat expresses more leptin mRNA than abdominal fat, this may partially explain the gender differences in leptin levels between the sexes (37).

**Second:** In women, estrogen was positively associated with leptin in agreement with previous report, Shimizu H. et al (38) they found estrogen increases in vivo leptin production. Androgens are known to play an important role in normal fat distribution (39).

**Third:** Testosterone levels were inversely associated with leptin levels in men. In addition a negative association between testosterone and leptin was also observed in women (40). In obese men increased BMI was associated with a substantial reduction in testosterone in men. In women, however, an association between testosterone and BMI was only found in overweight women. It is likely that testosterone plays a causal role in visceral fat accumulation (41).

Lower testosterone levels have been reported to predict visceral obesity and replacement doses of testosterone decreases abdominal fat mass in men with low testosterone levels (42,43).

The results of the present study were in agreement with Reidun O et al (40) they found that gender differences increase with increasing BMI and differences in life style parameters are predictors of serum leptin, serum leptin is especially low in men than women.

**Lipid profile (Total cholesterol, HDL-C, TG, VLDL and LDL-C):**

The results of present study show significant increase in (total cholesterol,
In psoriasis, a decrease of HDL synthesis and HDL structural changes can be observed, due to various biochemical disturbances, such as abnormalities of receptor function, changes of hepatic structure and function, activity changes of hepatocyte membranes, impaired RCT, esterification, and lipases.

The activation of the immune system in psoriasis may cause some changes in lipid profile of patients. However, these changes may be related to some abnormalities of the digestive system. The digestive system takes part in the decomposition, modification, and synthesis of many organic compounds, including lipids. In psoriatic patients, structural and functional abnormalities have been found in nearly all the segments of the gastrointestinal tract.

Blood lipid profile (total cholesterol, HDL-C, LDL-C and TGs) is a useful tool in determining the risks of cardiovascular diseases. LDL is bad cholesterol being associated in deposition of cholesterol on the walls of arteries and HDL is good cholesterol being associated in carrying cholesterol out of the blood system and is more compact than LDL-C.

Conclusions

The study concluded that psoriasis causes undesirable effects on leptin and lipid profile.

Recommendations

1. Evaluation of resistin in sera of psoriasis patients and correlates its concentration with disease severity.
2. Determination of insulin in sera of psoriasis patients and correlates its concentration with leptin concentration.
Study of serum leptin and lipid profile concentration….. Radwan A. Al-Asadi


References


