Serum Preptin and Amylin Values in Psoriasis Vulgaris and Behçet's Patients

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Background: Insulin resistance is found in both psoriasis and Behçet's disease. No study has yet explored whether preptin and amylin, two hormones associated with insulin resistance, are involved in the insulin resistance observed in patients with psoriasis and Behçet's disease. **Objectives:** We aimed to explore how the amounts of preptin and amylin change in psoriasis and Behçet's disease and whether they are involved in the etiopathology of these two diseases, by comparing hormone levels in patients and healthy controls. **Methods:** The study registered 30 patients with psoriasis, 30 patients with Behçet's disease, and 30 healthy volunteers (as a control group). Fasting blood sugar, triglyceride, LDL, VLDL, HDL, total cholesterol, HbA1c, C-peptide, insulin, and serum preptin and amylin levels were measured in all subjects. **Results:** Serum preptin and amylin levels were significantly lower in the patients with

psoriasis and Behçet's disease than in the control group ($P < 0.001$, $P = 0.004$, and $P = 0.008$, respectively). A comparison of the serum preptin and amylin levels between the patients with psoriasis and Behçet's disease did not reveal a statistically significant difference. Serum insulin level and The homeostasis model assessment of insulin resistance (HOMA-IR) index were significantly lower in the psoriasis patient group relative to the control group ($P = 0.02$ and $P = 0.03$, respectively), while the values for the Behçet's disease group did not differ significantly from those for the control group. **Conclusions:** Serum levels of preptin and amylin were significantly lower in patients with psoriasis and Behçet's disease, indicating that these hormones may be a factor for development of metabolic syndrome in these two diseases. J. Clin. Lab. Anal. 30:165–168, 2016. © 2014 Wiley Periodicals, Inc.

Key words: psoriasis; Behçet's disease; insulin resistance; preptin; amylin

INTRODUCTION

There is a relation between elevated insulin resistance and Behçet's disease, a systemic chronic disease presenting with dermatologic signs and relapse, and psoriasis, a chronic disease with dermatologic signs (1–4). Preptin and amylin are peptide hormones that are associated with insulin resistance (5–7). In the present study, we aimed to show how the amounts of preptin and amylin change in patients with psoriasis and Behçet's disease, and to determine whether they are related to disease severity by comparing the hormone levels in patients and healthy controls.

MATERIALS AND METHODS

The study registered 30 patients with psoriasis vulgaris and 30 patients with Behçet's disease who presented at the Dermatology Polyclinic of Firat University Hospital, as well as 30 healthy volunteers, all of whom were matched in

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terms of Body mass index (BMI) and age. Approval for the study was obtained from the Human Subjects Research Ethics Committee of Firat University on June 26, 2011.

Blood samples were collected at 09.00–10.00 in the morning after a night's fasting to avoid any effect associated with the circadian rhythm. Samples (5 ml) were collected after fasting from each participant and centrifuged at $3000 \times g$ for 5 min. The sera obtained were transferred to Eppendorf tubes and frozen at -80°C until the day of analysis.

Serum preptin levels were studied using a Human Preptin kit (cat. no: CK-E10788) and serum amylin levels were studied using a Human Amylin kit (cat. no: CK-e10377) (Hangzhou Eastbiopharm, China) by the enzyme-linked immunosorbent assay (ELISA) method. SPSS version 12.0 was used for statistical analyses. The data obtained in the study are expressed as the mean $\pm$ SD. Independent sample *t*-test and one-way ANOVA was used to compare groups. Values for which *P* was <0.05 were accepted as statistically significant.

RESULTS

The mean age of the participants was 34.43 ± 6.85 years for the patients with Behçet's disease, 34.13 ± 6.68 years for the patients with psoriasis, and 31.93 ± 6.49 years in the control group. There was no significant difference among the groups in terms of mean age ($P > 0.05$). Similarly, there were no significant differences in BMI between the Behçet's disease ($24.20 \pm 1.43 \text{ kg/m}^2$), psoriasis ($24.76 \pm 1.65 \text{ kg/m}^2$), and control groups ($24.12 \pm 2.28 \text{ kg/m}^2$) ($P > 0.05$). A comparison of the biochemical values for the patients and the controls is presented in Table 1.

Serum preptin levels in the psoriasis and Behçet's disease groups were significantly lower than those in the control group ($P < 0.001$ and $P = 0.004$, respectively). There was no significant difference in mean serum preptin levels between the psoriasis and Behçet's disease groups ($P > 0.05$) (Table 1, Figure 1). Serum amylin levels were statistically lower in the psoriasis and Behçet's disease groups than in the control group ($P = 0.004$ and $P = 0.008$, respectively). Psoriasis and Behçet's disease patients did not differ significantly with regard to mean serum amylin levels ($P > 0.05$) (Figure 1). There was not an association between severity of diseases and amylin–preptin levels in both of patient groups.

Of the psoriasis patients, 4 had hypertension, 8 (26.7%) had metabolic syndrome, 4 (13.33%) had insulin resistance, and 13 (43.3%) were smokers. Of the 30 patients with Behçet's disease, 8 (26.7%) had metabolic syndrome, 2 had hypertension, 5 (16.6%) had insulin resistance, and 12 (40%) were smokers. There was not a significant difference for serum amylin and preptin levels between Behçet's

disease and psoriasis patients who have metabolic syndrome or not.

Since the number of patients with insulin resistance was low, it was not possible to statistically compare the laboratory values of the patients with and without insulin resistance. However, when we compared the groups after excluding the patients with insulin resistance, we found that patients with psoriasis ($P < 0.001$ and $P < 0.001$, respectively) and Behçet's disease ($P = 0.04$ and $P = 0.009$, respectively) had significantly lower mean serum amylin and preptin levels than healthy controls.

Considering that serum preptin and amylin levels could be affected by smoking, corrected levels of preptin and amylin were subjected to evaluation by nominal regression. Serum preptin levels corrected according to these factors were found to be significantly lower in the psoriasis and Behçet's disease groups compared with healthy controls ($P < 0.001$). Corrected serum amylin levels were similarly shown to be significantly lower in the psoriasis and Behçet's disease groups than in the healthy controls ($P < 0.004$, $P = 0.008$, respectively).

DISCUSSION

The results that we report are consistent with the low serum preptin levels (8) found in patients with gestational diabetes. However, Yang et al. (9) reported that plasma preptin levels of patients with type 2 diabetes mellitus (DM) were higher than those of the healthy controls. Aslan and colleagues (10) examined preptin levels in serum samples from 31 pregnant women with gestational diabetes and 31 age-matched healthy pregnant women without gestational diabetes, and in the cord blood of their fetuses. They found that preptin levels in the mothers' serum and fetal cord blood were higher in the group with gestational diabetes than in the control group. In another study, Celik et al. (11) studied serum preptin levels in patients with polycystic ovary syndrome and age- and BMI-matched healthy controls and reported higher BMI, waist circumference, blood pressure, serum preptin, insulin levels, and HOMA-IR index values in polycystic ovary syndrome (PCOS) patients.

Since our study registered patients and controls, both of whom were very similar in terms of BMI, very few of our subjects had accompanying insulin resistance. Therefore, it was not possible for us to statistically examine the laboratory values of patients with and without insulin resistance. However, when we excluded the few patients and controls with insulin resistance, we found a significant decrease in serum preptin levels in patients with psoriasis and Behçet's disease. Given that Yang et al. (9) only found elevated preptin levels in patients with type 2 DM, and not in patients with impaired glucose tolerance, their result is congruent with ours. However, we did not find a

TABLE 1. Values for Biochemical Parameters in Behçet's Disease and Psoriasis, in Comparison With Controls

Parameter	Psoriasis (n = 30, 15 F/15 M)	Behçet's disease (n = 30, 15 F/15 M)	Control (n = 30, 15 F/15 M)	P value
Glucose (mg/dL)	85.0 ± 11.70	81.0 ± 10.77	83.0 ± 10.26	<i>P</i> > 0.05
Triglycerides (mg/dL)	112.10 ± 64.78	122.53 ± 51.59 ^a	94.30 ± 34.32 ^a	^a <i>P</i> = 0.01
LDL-cholesterol (mg/dL)	112.13 ± 32.25	111.43 ± 35.30	113.36 ± 30.69	<i>P</i> > 0.05
HDL-cholesterol (mg/dL)	46.68 ± 13.73	43.35 ± 9.00	49.54 ± 12.94	<i>P</i> > 0.05
VLDL-cholesterol (mg/dL)	21.66 ± 10.79	24.60 ± 10.06	23.36 ± 17.19	<i>P</i> > 0.05
Total cholesterol (mg/dL)	182.50 ± 34.53	169.53 ± 48.68	167.63 ± 31.3	<i>P</i> > 0.05
HbA1c (%)	4.78 ± 0.39	4.69 ± 0.30	4.81 ± 0.36	<i>P</i> > 0.05
Insulin (ng/mL)	4.78 ± 3.41 ^b	6.66 ± 6.54	7.21 ± 4.3 ^b	^b <i>P</i> = 0.02
C-peptide (ng/mL)	1.99 ± 0.70	2.00 ± 1.61	1.68 ± 0.51	<i>P</i> > 0.05
HOMA-IR	1.00 ± 0.73 ^c	1.36 ± 1.37	1.48 ± 0.93 ^c	^c <i>P</i> = 0.03
Amylin (pg/mL)	637.13 ± 585.10 ^d	760.67 ± 825.27 ^c	1514.46 ± 1086.68 ^{d,e}	^d <i>P</i> < 0.001 ^e <i>P</i> = 0.004
Preptin (pg/mL)	475.71 ± 473.52 ^f	541.55 ± 378.15 ^g	987.45 ± 806.93 ^{f,g}	^f <i>P</i> = 0.04 ^g <i>P</i> = 0.008

*Mean ± SD.

^a*p* = 0.01, ^b*p* = 0.02, ^c*p* = 0.03, ^d*p* < 0.001, ^e*p* = 0.004, ^f*p* = 0.04, ^g*p* = 0.008

significant difference in serum preptin and insulin levels between patients and controls with and without metabolic syndrome. Moreover, since our extensive literature search did not reveal any study addressing preptin levels in patients with psoriasis, we cannot compare our results with previous studies.

Amylin, another peptide associated with insulin resistance, was first isolated in 1987 and described as the major component of the extracellular amyloid found in pancreas islet cells in many patients with type 2 DM. Amylin levels were observed to rise in obese children, adults with impaired glucose tolerance, obese adults with type 2 DM, women with PCOS, and preterm babies with food intolerance (12, 13).

A study of 1,059 Chinese subjects, including 500 obese patients and healthy controls who were similar in terms of age and sex, examined the relationships between amylin level and metabolic syndrome and inflammatory markers, and showed that serum amylin levels were higher in older people (over 45 years) and obese people, as compared to younger individuals and those with normal weights. When the subjects were allocated to groups on the basis of amylin level quartiles, the subjects in the highest quartile were found to have higher values for BMI, waist circumference, blood pressure, fasting glucose, insulin, HOMA-IR, amylin/insulin ratio, total cholesterol, LDL, and triglycerides, and lower HDL levels. It was determined in that study that there was a strong correlation

Fig. 1. Serum amylin and preptin levels in patients with psoriasis and Behçet's disease, as compared to control subjects.

between amylin and metabolic syndrome in the Chinese population, and that this correlation was independent of risk factors such as obesity, inflammatory markers, and insulin resistance (12).

Reinehr et al. (13) compared serum amylin levels and metabolic parameters in 37 obese children and 16 thin children who were similar to the obese children in terms of age, sex, and pubertal stage. The authors reported that serum amylin, triglyceride, LDL, and insulin levels were significantly higher in the obese children than in the thin children, and that serum amylin level was correlated with insulin and triglyceride levels, but not with age, sex, pubertal stage, and BMI. In that study, obese children were included in a multifaceted weight loss program for 1 year. Then, when the values for children who lost weight over the period of 1 year were compared to the previous year's values, serum triglyceride, LDL, insulin, and amylin levels, as well as HOMA-IR index scores, were found to be significantly reduced. It was thus concluded that fasting amylin level was independent of age, sex, body fat percentage, and pubertal phase, that amylin levels in obese children were associated with triglycerides and insulin hypersecretion, and that amylin levels were normalized after weight loss.

Unlike these studies, we found that amylin levels were lower in patients with psoriasis and Behçet's disease in the present study. Hou et al. (12) found high serum amylin levels in Chinese subjects who were old and overweight. Similarly, Reinehr et al. (13) reported that obese children had high amylin levels, which declined after a 1-year period of weight loss. Our study may have produced different results because it registered subjects who were similar in terms of age and BMI.

In conclusion, this is the first study to examine serum preptin and amylin levels in patients with psoriasis and Behçet's disease. The reduced serum preptin and amylin levels may be a factor for development of metabolic syndrome in these two diseases.

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