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ORIGINAL PAPER

Increased plasma resistin and decreased omentin levels in Japanese patients with psoriasis

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Abstract Psoriasis is associated with obesity accompanied by insulin resistance. A recent study disclosed increased plasma resistin and decreased plasma omentin levels in obesity. Few studies of plasma levels of resistin and omentin are available in psoriasis. We analyzed plasma levels of resistin and omentin in psoriasis and compared them with those of healthy controls. Evaluation of plasma levels of resistin and omentin was performed by enzyme-linked immunosorbent assay (ELISA) for 62 psoriasis patients and 58 healthy controls. The severity of psoriasis was evaluated by psoriasis area and severity index (PASI) score. Plasma levels of resistin were significantly increased in psoriasis as compared with those of healthy controls. In contrast, plasma levels of omentin were significantly decreased in psoriasis patients. Plasma levels of resistin and omentin were positively and negatively correlated with PASI scores, respectively. After the treatment of psoriasis, resistin levels were decreased and omentin levels were increased, respectively, compared with those of pretreated. Plasma levels of resistin and omentin might be useful for evaluating the disease activity of psoriasis.

Keywords Disease activity · Omentin · Resistin · Psoriasis

Introduction

Psoriasis is a hyperproliferative inflammatory skin disorder with increased blood vessels. Although the precise pathomechanism remains unknown, various cytokines and growth factors are assumed to be involved [3, 10]. Previous study revealed that obesity is more prevalent in psoriasis than in healthy controls [4, 14].

Adipose tissue is not only an energy-storing organ but also a major source of adipokines, such as adiponectin, leptin, and TNF-α. In psoriasis, serum levels of TNF-α, and leptin were increased, and adiponectin levels were decreased, respectively, which were associated with the severity of the disease [13]. Resistin is an adipose tissue-derived adipokine and is linked to inflammation, immunity, obesity, and insulin resistance [2]. Recent study revealed that serum levels of resistin in moderate-to-severe psoriasis show a significant positive correlation with the disease severity [1]. Omentin is a secretory protein which is mainly produced by visceral adipose tissue [15]. Omentin increases insulin sensitivity by stimulating glucose uptake in human adipose tissue and by increasing insulin signal transduction [15]. No study is available on the omentin blood levels in psoriasis.

We examined plasma levels of resistin and omentin in psoriasis patients. We also analyzed these parameters in terms of disease severity and the changes between pre- and post-treated psoriasis patients.

Materials and methods

Patients

A total of 62 psoriasis patients, including 41 males and 21 females aged 27–74 (mean age 44.2), PASI 6.7–32.3 (mean 11.5), body surface area (BSA) 7–67 (mean 11.4) were enrolled. The patients include treated, untreated, well-controlled, and poor-controlled psoriasis at the time of

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resistin and omentin measurements. These patients were treated with topical steroid, topical vitamin D3, narrow band ultraviolet B irradiation or systemic treatment (etretinate, ciclosporin). A control population of 58 (40 males and 18 females, mean age 39.5, 29–69) was also enrolled. No significant difference in body mass index between psoriasis and healthy control was observed. Psoriasis severity was determined by psoriasis area and severity index (PASI) score. A signed informed consent was taken from all the patients and controls according to the guidelines of the Asahikawa Medical School Ethics Committee.

Plasma

Blood samples (5–10 ml) were taken in vacutainer tubes under sterile conditions from patients and controls between 8.30 and 10 a.m. Plasma was obtained fresh, and centrifuged, and was immediately frozen at −70 °C and stored until use.

Assays of resistin and omentin

Plasma levels of resistin and omentin were measured by enzyme-linked immunosorbent assay (ELISA) kits, Bio-Vendor (Modrice, Czech Republic). These assays detected only human cytokines and the minimal detectable concentrations of resistin and omentin were 0.03 and 0.5 ng/ml, respectively.

Statistical analysis

The plasma levels of cytokines were presented as an arithmetic mean ± SD. Mann–Whitney *U* test was used to compare the mean values, and the correlation was determined by Spearman's coefficient.

Results

Plasma levels of resistin were compared between psoriasis patients (62 cases) and healthy controls (58 cases). The plasma levels of resistin were significantly increased in psoriasis (14.8 ± 2.1 ng/ml) compared with those of healthy controls (7.3 ± 1.9 ng/ml) (Fig. 1a). Plasma levels of resistin in psoriasis were positively correlated with PASI score ($r = 0.56$) (Fig. 1b). After the treatment, the plasma levels of resistin were significantly decreased compared with those of pretreatment (Fig. 1c).

Plasma levels of omentin were compared between the psoriasis patients and healthy controls. The plasma levels of omentin were significantly decreased in psoriasis (315 ± 526 ng/ml) as compared with those of healthy controls (625 ± 32 ng/ml) (Fig. 2a). Plasma levels of omentin in psoriasis were negatively correlated with PASI score ($r = -0.54$) (Fig. 2b). After the treatment, the plasma levels of omentin were significantly increased as compared with those of the pretreatment (Fig. 2c).

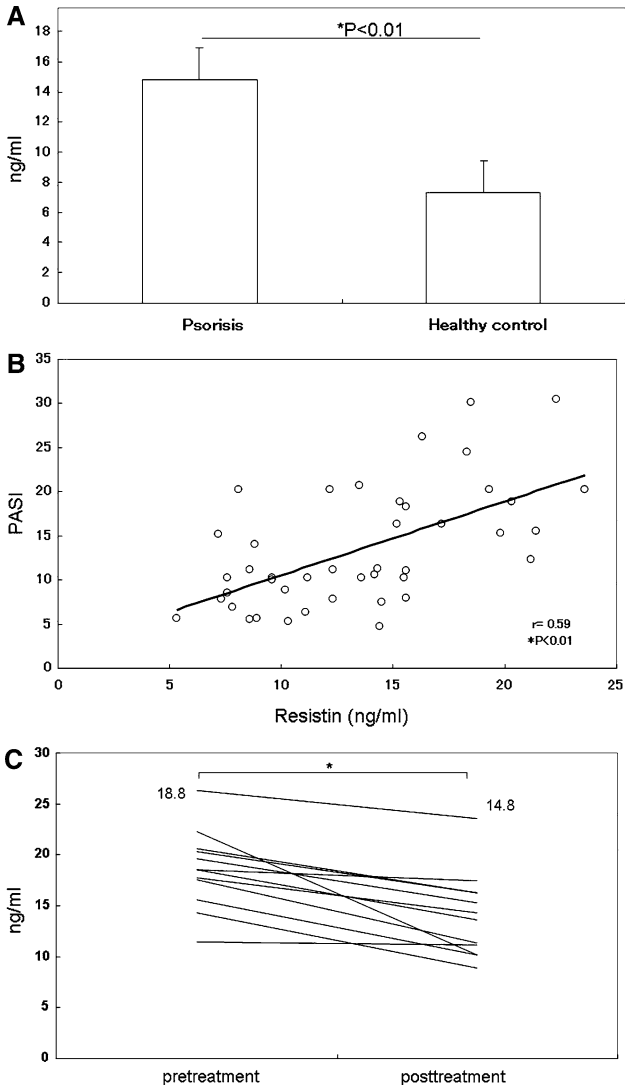

Fig. 1 Plasma resistin levels in psoriasis patients. **a** Plasma levels of resistin in psoriasis patients and healthy control. **b** Correlation between PASI and plasma resistin levels in psoriasis patients. **c** Plasma levels of resistin in pretreated and posttreatment psoriasis patients. $*P < 0.05$

Discussion

In this study, we show that plasma levels of resistin are increased and those of omentin are decreased in psoriasis patients as compared with healthy controls and that the levels were correlated with the severity of psoriasis. Previous studies also showed that the levels of resistin were

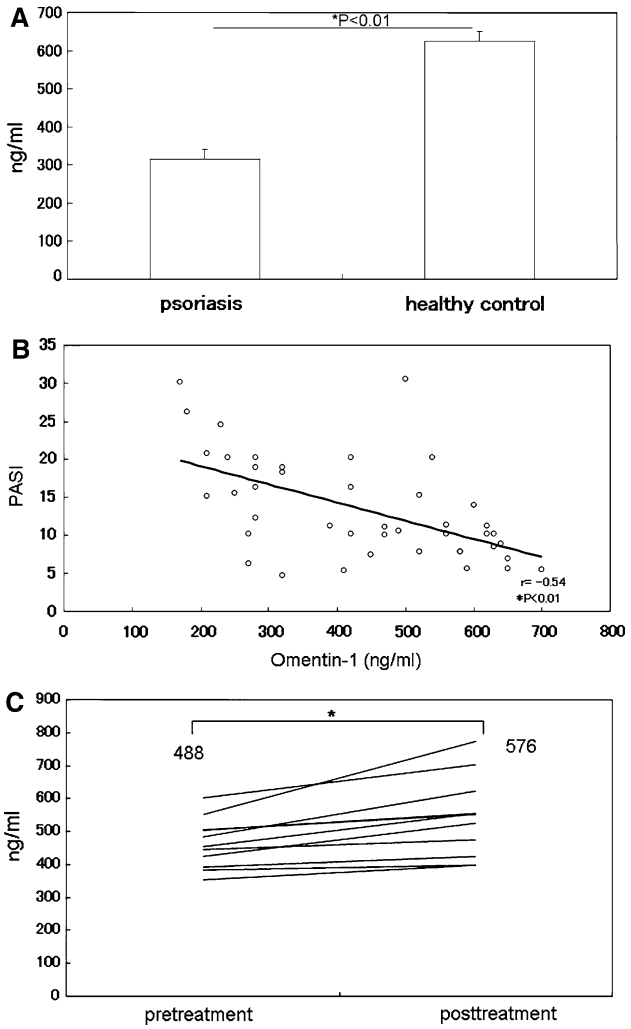

Fig. 2 Plasma omentin levels in psoriasis patients. **a** Plasma levels of omentin in psoriasis patients and healthy control. **b** Correlation between PASI and plasma omentin levels in psoriasis patients. **c** Plasma levels of omentin in pretreated and posttreatment psoriasis patients. $^{*}P < 0.05$

increased in psoriasis and were positively correlated with PASI score [5]. Nakajima et al. [8] reported that serum levels of adiponectin, another adipokine, were positively correlated with the PASI score. Furthermore, Kawashima et al. [6] reported significantly decreased resistin levels after ultraviolet irradiation treatment. In our study the plasma levels of resistin significantly decreased after the treatment accompanied with the decreased PASI score. Previously we demonstrated other adipokines, leptin and adiponectin, were increased and decreased, respectively, in psoriasis patients [13]. Our preliminary examination revealed that the plasma levels of both adipokines were not significantly altered after the psoriasis treatment (data not shown) suggesting resistin as a more adequate evaluation marker of the psoriasis treatment. Johnston et al. [5] demonstrated that resistin induced CXCL8 and TNF-α in blood monocytes. Because both CXCL8 and TNF-α are significantly involved in the pathophysiology of psoriasis, the increased plasma levels of resistin in psoriasis might contribute to the effector molecules involved in psoriasis.

Omentin is a newly identified secretary protein that is highly expressed in visceral adipose tissue [2, 7, 9, 15]. Omentin increases insulin sensitivity by glucose uptake in adipose tissue [15]. Previous study revealed that plasma levels of omentin were negatively correlated with BMI, leptin and obesity, and were positively correlated with adiponectin and high density lipoprotein (HDL) suggesting omentin as a useful maker of obesity [11]. In the present study we for the first time showed that the plasma levels of omentin were significantly decreased in psoriasis and were negatively correlated with its severity. The plasma levels of omentin were significantly increased in treated psoriasis suggesting that omentin is also a good parameter of the psoriasis treatment. Insulin resistance and diabetes mellitus (DM) are prevalent in psoriasis and our analysis in Japanese psoriasis patients showed high odds ratio of DM (2.28; 1.15–4.52) compared with other skin disease patients [12]. Low plasma levels of omentin in psoriasis might contribute to the insulin resistance in psoriasis.

Kawashima et al. [6] showed phototherapy reduced resistin levels in psoriasis patients. In our study, psoriasis patients were treated with topical glucocorticoids, active vitamin D3 ointment, ultraviolet B irradiation and cyclosporin. The plasma levels of resistin were decreased and omentin levels were increased concomitant with the decrease in PASI scores. Thus we conclude that the plasma levels of resistin and omentin reflect the improvement of psoriatic lesion, which is not specific to ultraviolet irradiation therapy.

Conclusion

Plasma resistin levels are increased and omentin levels are decreased in psoriasis and the levels of these adipokines were associated with the disease severity. The fluctuations of these adipokine levels might be useful markers for the assessment of psoriasis treatment.

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