Comparison of soluble E-selectin serum levels in two chronic inflammatory skin diseases: atopic dermatitis and psoriasis

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ABSTRACT

Background: Atopic dermatitis and psoriasis are common chronic cutaneous diseases of different pathogenetic aspects. Atopic dermatitis is considered as Th-2 and psoriasis as Th-1 type dermatosis, and this difference may lead to different expression of adhesion molecules.

Objectives: This study was undertaken to evaluate soluble E-selectin serum levels in atopic dermatitis and psoriasis and to correlate its expression with the disease's severity.

Material and methods: 16 patients suffering from atopic dermatitis, 20 psoriatic patients and 20 healthy individuals (control group) were included into the study. Soluble E-selectin serum levels were measured by ELISA using commercially available kits (R&D Systems). Severity of atopic dermatitis was assessed according to SCORAD and of psoriasis by PASI score.

Results: The average serum level of soluble E-selectin in atopic dermatitis patients was 76.6±41.7 ng/ml and did not significantly differ from that in psoriatic patients - 60.9±33.2 ng/ml. Soluble E-selectin serum levels both in atopic dermatitis and psoriasis were significantly increased ($p<0.0002$ and $p<0.0005$, respectively) compared to the control group, 28.7±9.5 ng/ml. Significant correlations ($p<0.02$) were found between soluble E-selectin serum levels and severity of atopic dermatitis and psoriasis.

Conclusion: The enhanced endothelial activity (similar degree of activation) is a characteristic phenomenon for atopic dermatitis and psoriasis. The serum expression of soluble E-selectin could be used as a marker of disease's activity.

KEY WORDS

E-selectin, adhesion molecules, atopic dermatitis, psoriasis

Introduction

Atopic dermatitis is a chronic inflammatory skin disease characterized by the infiltration in the dermis, which mainly consists of T cells, monocytes and macrophages (1). Psoriasis is also a chronic inflammatory dermatosis marked by hyperproliferation of epidermis and mononuclear infiltrate in both dermis and epidermis (2,3). Although both these cutaneous diseases are of chronic inflammatory type, their pathogenesis shows many dif-

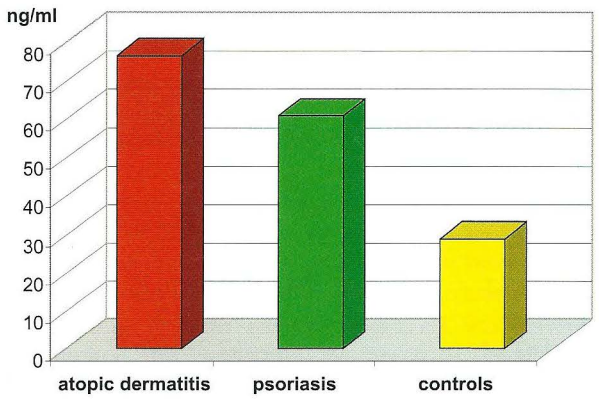

Figure 1. Soluble E-selectin serum levels in atopic dermatitis, psoriasis and control group.

ferences. Atopic dermatitis is regarded as a Th2- or Th0-type disease (4,5), whereas psoriasis is considered to be a Th1-type dermatosis (6). These variations result in production of different cytokines, which in turn could lead to different expressions of adhesion molecules on microvascular endothelium.

E-selectin is a single chain glycoprotein adhesion molecule of molecular mass 115 kDa (7). It represents a recently described family of adhesion molecules: LEC-CAM (lectin, EGF, complement-related cell adhesion molecules) (8). E-selectin is crucially involved in the adherence between microvascular endothelium and monocytes, neutrophils, eosinophils and finally memory T cells (9,10). A soluble form of E-selectin (sE-selectin) has been identified and this form is nowadays regarded as a marker of endothelial cell activation (11).

The aim of the present study was to evaluate and compare sE-selectin serum levels in two chronic inflammatory diseases of different pathogenetic aspects to see if there was any difference in endothelial cell activation between atopic dermatitis and psoriasis. Moreover, we studied the possibility of using sE-selectin as a marker of the disease activity.

Material and Method

Patients

Sixteen patients with typical atopic dermatitis and twenty patients suffering from psoriasis vulgaris were included in the study. The diagnosis of atopic dermatitis was based on the criteria described by Rajka and Hanifin (12). The severity of atopic dermatitis was assessed according to SCORAD system (13) and of psoriasis with psoriasis area and severity index (PASI) (14,15). The demographic details of the study groups are given in table 1. All these patients had not been treated with any systemic or topical drugs for at least 1 month before the beginning of the study. Twenty sex- and age-matched healthy individuals with no personal and family history of atopy and psoriasis served as controls.

Measurement of sE-selectin and IgE serum levels

Eight milliliters of peripheral blood were collected from all individuals during the exacerbation of the disease. After 60 min at room temperature the blood was centrifugated for 10 min, the serum was aspirated and frozen at -75°C until use. Soluble E-selectin was measured by ELISA using a commercially available kit from R&D Systems (Abingdom, UK) (sensitivity <0.1 ng/ml, sample volume 100 µl). The assays were performed strictly according to the manufacturer's instructions. Extinction was measured at 450 nm using an automatic analyzer (Stat Fax 2100, Awareness technology Inc., Palm City, FL, USA). Results were calculated from the standard curve of lyophilized recombinant human

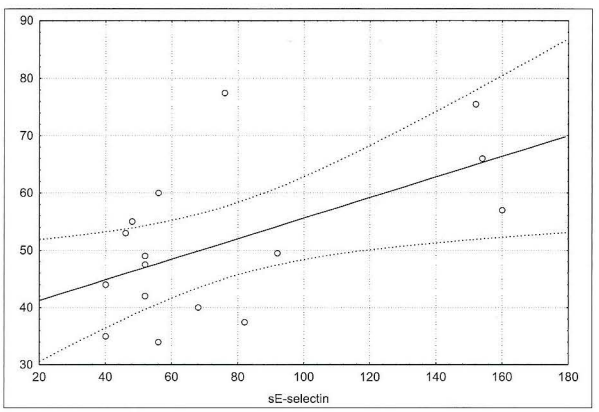

Figure 2. Correlation of sE-selectin serum levels and clinical activity of atopic dermatitis (SCORAD).

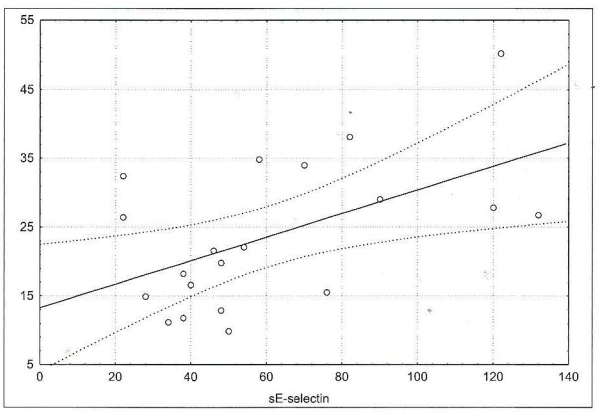

Figure 3. Correlation of sE-selectin serum levels and clinical activity of psoriasis (PASI).

Table 1. Demographic data of studied patients

Parameter		Atopic dermatitis		Psoriasis
Number		16		20
Gender (females/males)		5/11		9/11
Age[years]	mean	44.2±15.2		25.0±14.0
	range	9-52		19-65
Severity[points]	mean SCORAD	50.2±13.7	PASI	23.7±10.6
	range	34-77.5		9.9-50.2
Duration of the disease [years]	mean	22.4±15.1		12.2±12.8
	range	3-40		0.5-38
Duration of the last outbreak	mean	4.3±2.5		11.5±10.6
[weeks]	range	1-8		2-40

soluble E-selectin and were expressed as ng/ml. Moreover, in all atopic dermatitis patients' sera total IgE was measured by nephelometric method using commercially available reagents - N Latex IgE (Dade Behring Marburg GmbH, Marburg, Germany).

Statistical analysis

Mann-Whitney *U*-test and Spearman rang correlation were used to test statistical significance. *P* values less than 0.05 were considered significant.

Results

The average serum level of sE-selectin in atopic dermatitis patients was 76.6±41.7 ng/ml (range: 40-160 ng/ml) and was only slightly (not significantly) higher that in psoriatic patients, 60.9±33.2 ng/ml (range: 22-176 ng/ml). Soluble E-selectin serum levels both in patients suffering from atopic dermatitis and psoriasis were significantly increased ($p<0.0002$ and $p<0.0005$, respectively) compared to healthy individuals, 28.7±9.5 ng/ml (range: 16-48 ng/ml). Figure 1.

Moreover, a significant positive correlation ($r=37$, $p<0.05$) was demonstrated between sE-selectin serum levels and severity of atopic dermatitis assessed by SCORAD. Figure 2. Similarly, sE-selectin significantly correlated ($r=42$, $p<0.02$) with clinical intensity of psoriasis (PASI). Figure 3. No relationships were observed between serum levels of sE-selectin and duration of the diseases, as well as duration of the last exacerbations of atopic dermatitis and psoriasis. In atopic dermatitis patients sE-selectin serum levels showed no association with serum IgE levels (data not shown).

Discussion

E-selectin is involved in the recruitment of leukocytes to the site of inflammation, and is believed to play an important role in determining the intensity of an inflammatory infiltrate (16,17). Soluble form of E-selectin was shown to be increased in a variety of inflammatory and autoimmune diseases, including arthritis (18), giant cell arteritis, scleroderma, systemic lupus erythematosus, polyartheritis nodosa (19) and seborrheic dermatitis (20). Moreover, recently several researches found elevated serum level of sE-selectin in atopic dermatitis (17,20-27) and psoriasis (10,24,27-31), which is in agreement with our present observations. To the best of our knowledge there are only two reports directly comparing sE-selectin serum levels in these two common chronic inflammatory dermatoses, namely atopic dermatitis and psoriasis (24,27). Groves et al. (27) studied erythrodermic manifestations of both dermatoses and found no significant difference in serum expression of E-selectin. The present study, as the one by Czech et al. (24), demonstrated no marked variations between serum levels of sE-selectin in patients suffering from wide clinical spectra of atopic dermatitis and psoriasis; significant increase of this adhesion molecule was however, found in both dermatoses compared to the control group. Atopic dermatitis and psoriasis differ in some pathological mechanisms (1-6), the above mentioned findings suggest that in both dermatoses the endothelial cell activation is similarly enhanced. Kägi et al (32) however, postulated, that atopic dermatitis is a heterogeneous disease with so-called extrinsic (allergic) and intrinsic (non-allergic) types. In their study two of three atopic dermatitis patients with normal sE-selectin levels were of intrinsic type (17). These observations require further studies. It is worth remembering that the ligand for E-selectin is a cutaneous lymphocyte-associated antigen *(CLA),* which is regarded as a *skin-homing receptor* and plays a crucial role in several dermatological conditions (26,33,34).

Nowadays several immunological parameters are used as markers of diseases activity (10,35-37). Our study, showing significant positive correlation between sE-selectin values and SCORAD, confirms observations

by others (20-27), that sE-selectin is a good marker of the clinical intensity of atopic dermatitis. Kägi et al (17) found significant correlation between changes in sE-selectin levels and the changes in scores for the severity and extent of atopic dermatitis. They were unable to demonstrate significant relationship between sE-selectin values and both itch and sleep disturbance scores. This is in contrast to the data provided by Furue et al (26) who clearly showed association between sE-selectin levels and intensity of itch. Literature data on relationship between sE-selectin and IgE serum levels are limited and conflicting. We, as Morita et al. (23), found no association between two above mentioned parameters, however, in another paper sE-selectin levels significantly correlated with total IgE levels (26). Increased IgE levels are frequently observed in atopic dermatitis patients, but this increase is not obligatory (17). Therefore, the differences in the evaluation of correlation between sE-selectin and IgE might be due to different populations of patients. The opinions about possible use of sE-selectin in the evaluation of psoriasis severity are also controversial (10,24). Recent studies (10,30,31), as the present one, suggest significant relationship between sE-selectin serum levels and extent of psoriatic lesions. Moreover, in our previous paper, we demonstrated marked decrease of sE-selectin serum levels after effective treatment of psoriasis (10), and this may additionally argue for the usefulness of sE-selectin measurement as marker of disease intensity.

Conclusion

In conclusion, endothelial cell activation, as shown by sE-selectin serum levels, was enhanced in atopic dermatitis and psoriasis. The degree of this increase is similar in both dermatoses. Moreover, serum levels of sE-selectin are believed to be adequate markers of disease activity in both atopic dermatitis and psoriasis.

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