Increased concentration of platelet-derived chemokines in serum of patients with delayed pressure urticaria

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ABSTRACT. Background. Delayed pressure urticaria (DPU) is a distinct form of urticaria, characterized by marked dermal swelling, deep inflammatory infiltrate and systemic symptoms. Little is known about inflammatory mediators involved in this disease. Objective. To investigate secretion of platelet-specific chemokines, platelet factor 4 (PF-4) and beta-thromboglobulin (beta-TG) during the course of DPU. Methods and material. Plasma concentrations of PF-4 and beta-TG were measured in eight adult DPU patients and in 15, age- and sex-matched, healthy controls. Results. Plasma PF-4 and beta-TG concentration scores were significantly higher in the DPU group as compared with the control subjects. Conclusion. The present study, as well as an earlier contribution, suggest that distinct platelet activity may be identified in different types of urticaria. In contrast to chronic idiopathic urticaria, chronic urticaria with a positive response to autologous serum skin testing, and acute urticaria, delayed pressure urticaria may be associated with increased secretion of platelet chemokines, similar to that observed in cold urticaria.

Keywords: delayed pressure urticaria, platelet activation, platelet factor 4, beta-thromboglobulin

PATIENTS AND METHODS

Eight patients (five males and three females; mean age 40.5 years) with DPU (table 1) were enrolled. They all showed large, painful hives. The patients had received no medication (corticosteroids and/or antihistamines) for at least 48 hours before the test. No other diseases were present. The control group comprised 15 healthy, age- and sex-matched subjects.

Blood sampling; beta-TG and PF-4 measurement
Blood was obtained in the morning (in the fasting state) into Diatube® H tubes (Becton Dickinson) to minimize ex vivo platelet activation [10], then immediately placed in an ice/water bath. The tubes were then centrifuged at 2 500 g for 30 minutes at 4°C, and the top third of the resultant plasma supernatants was collected and frozen at -20°C for evaluation. Plasma levels of beta-TG and PF-4 were measured by enzyme-linked immunosorbent assay (ELISA), using a commercial Asserachrom® kit (Diagnostica Stago, France).
Statistical analysis

Data were delivered as medians and ranges, and comparisons between the groups were performed using the Mann-Whitney’s unpaired rank sum test. The correlation coefficient was obtained using the Spearman test. P values below 0.05 were considered significant.

RESULTS

Table 2 points to significant differences between patients with DPU and the control subjects for the indices of platelet activity examined. Plasma beta-TG and PF-4 concentration scores were significantly increased in the DPU group as compared to the control subjects. No differences in peripheral platelet counts for the two groups were noted (data not included). Moreover, no significant correlation was found between plasma concentrations of beta-TG and PF-4 and ESR in DPU patients.

DISCUSSION

Platelet infiltrates have been demonstrated in patients with cold urticaria [11]. It has been reported that platelet activation, measured by plasma levels of PF-4, may occur in patients suffering from cold urticaria [12] and cold urticaria accompanied by vasculitis [13].

We have reported previously that platelet activity measured as plasma levels of platelet-derived chemokines did not increase in patients suffering from chronic idiopathic urticaria [14], patients with chronic urticaria with a positive response to autologous serum skin testing [15] or acute urticaria [16].

To identify any possible differences in systemic platelet activity in patients with different types of urticaria, the present study investigated plasma concentrations of PF-4 and beta-TG in DPU patients.

We observed increased plasma levels of PF-4 and beta-TG in patients suffering from DPU, suggesting an enhanced release of the platelet mediators. On one hand, increased platelet activity might be a consequence of mediators released from mast cells and during the later stage associated with the inflammatory response. Is this, however, a case of an excessive secretion of platelet-specific mediators involved in the development of DPU lesions? At present, the pathophysiological significance of such findings is unknown and the increased platelet activity might only be an accompanying phenomenon appearing as the response of different systems to the progressing illness.

The present study, as well as some earlier contributions, suggest that distinct platelet activity may be identified in different types of urticaria. In contrast to chronic idiopathic urticaria, chronic urticaria with a positive response to autologous serum skin testing and acute urticaria, delayed pressure urticaria may be associated with increased secretion of platelet chemokines, similar to that observed in cold urticaria.

Platelet-derived chemokines should be the subject of further investigation, and studies should be extended to include a larger group of DPU patients.

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REFERENCES


Table 1

<table>
<thead>
<tr>
<th>Patient number</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Disease duration (months)</th>
<th>Concurrent chronic urticaria</th>
<th>General symptoms</th>
<th>ESR</th>
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<tbody>
<tr>
<td>1</td>
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<td>45</td>
<td>48</td>
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</tr>
<tr>
<td>2</td>
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<td>11</td>
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<td>5</td>
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<tr>
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<td>18</td>
</tr>
<tr>
<td>8</td>
<td>F</td>
<td>37</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>10</td>
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</table>

M: male; F: female; erythrocyte sedimentation rate (ESR).

Table 2

<table>
<thead>
<tr>
<th>Parameters analysed</th>
<th>Healthy controls (n = 15)</th>
<th>DPU patients (n = 8)</th>
<th>Statistical analysis (p)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Median range</td>
<td>Median range</td>
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</tr>
<tr>
<td>PF-4 (IU/mL)</td>
<td>5.0</td>
<td>9.95</td>
<td>0.001</td>
</tr>
<tr>
<td>Beta-TG (IU/mL)</td>
<td>21.5</td>
<td>30.75</td>
<td>0.01</td>
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<tr>
<td></td>
<td>(n=15)</td>
<td>(n=8)</td>
<td></td>
</tr>
</tbody>
</table>

n: number of subjects; DPU: delayed pressure urticaria.

a: number of subjects; DPU: delayed pressure urticaria.


