Chemical Analysis of Parotid Saliva and Lacrimal Fluid in Psoriatics

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Summary. A total of 28 psoriatics and the same number of healthy individuals as controls were subjected to chemical analyses of their lacrimal fluid and parotid saliva to assess whether any functional disturbances attributable to psoriasis were detectable, i.e. if they have sicca syndrome (SS) or not.

The stimulated parotid flow rate and Schirmer test I proved to be normal in both series. A significant elevation of salivary IgA, α-amylase, and Na⁺ was found in psoriatics when compared with the controls. On the other hand, salivary lysozyme values in psoriatics were markedly lowered. There was a distinct interrelationship between salivary IgA, β₂-microglobulin, and lysozyme detectable in both series.

The findings are discussed in terms of the increased immunological activity in psoriasis, and the possible role of cAMP and neural regulation in the causation of elevated amylase and Na⁺ levels in psoriatics is hypothesized. These alterations in salivary constituents might provide a protective system for oral mucous membranes against this skin disease.

Key words: Psoriasis vulgaris — Salivary glands — Sialochemistry

Introduction

It was recently demonstrated that various abnormalities in immune functions and in immunoglobulin synthesis exist in patients with a variety of skin diseases, psoriasis vulgaris included [4, 11, 15, 27]. In psoriatics, there is, however, considerable divergence among the findings of serum IgG and IgM levels [8, 15, 17, 22], whereas IgA levels in serum are commonly found elevated in these patients. In saliva, even diurnal variations of IgA have been reported [5].

The components of sicca syndrome (SS), i.e., keratoconjunctivitis sicca and xerostomia, have been also described as complications of psoriasis, although not regularly [28, 29]. This would suggest a predisposition of psoriatics to mild SS, i.e., the primary Sjögren's syndrome [28, 29]. However, in a recently published systematic survey of psoriatics, abnormalities could not be found in minor labial salivary gland biopsies, which is the most commonly used diagnostic technique for SS [25, 26]. As far as the author is aware, in psoriatics, no reports are available on the salivary constituents known to be deranged in the patients with SS. The aim of the present communication is to assess whether any such disturbances in lacrimal and salivary gland affection by psoriasis vulgaris.

Material and Methods

The material of this study consists of 28 psoriatics (12 men, 16 women, mean age 42.8 ± 13.9 years) with histologically verified cutaneous lesions of stationary type, not complicated with arthritis. As a control series, a group of 28 age- and sex-matched healthy subjects was studied.

The salivary samples for the flow rate measurements and for chemical analyses were collected from the left parotid gland under continuous stimulation with citric acid (2% solution, five drops every 30 s). The device used for collecting the saliva was a modified Curby cup made of silver [25]. Flow rate measurements were done using the stimulated parotid saliva collected from the orifice of Stensen's duct. The saliva produced in 5 min was allowed to run through the cup directly into 10 ml test tubes and then measured. In cases where the amount of saliva remained less than 3 ml in the 5-min collection time, collection was continued until this volume was reached. This was necessary for the chemical analyses to be performed. The samples were immediately frozen and stored at —20°C until assayed. The tear flow rate was measured using the conventional Schirmer test I, as recently detailed [25].

The chemistry of the saliva (Na, K, Cl, Urea, amylase, IgA, IgM, lysozyme, and β₂-microglobulin) and lacrimal fluid (amylase, lysozyme and β₂-microglobulin) was analyzed at the Laboratory of Clinical Chemistry, Kuopio University Central Hospital, as previously described [25]. In brief, Na and K concentrations were
determined by flame photometer with internal lithium standard. Chloride levels were measured colorimetrically. Active α-amylase was determined by the Phadebas (Pharmacia, Uppsala, Sweden) method [6]. Urea was assessed by the urease enzyme technique [7], and IgA and IgG by radial immunodiffusion using low levels quanti-plates (Kallestad Laboratories, Chaska, MN, USA) [16]. In lysozyme determinations, the lysoplate (Kallestad Laboratories) method was used [20], and β2-microglobulin was measured by radioimmunoassay, as previously detailed [9].

For the statistical calculations, Student's t-test and correlation analysis were used, where separately indicated.

Results

The mean rates of the stimulated parotid saliva are shown to fall within normal limits in both series, as indicated in Table 1. In psoriatics, the flow rate was slightly lower, but the difference was insignificant.

Table 2 summarizes the results of Schirmer test 1. The values are within the normal range, and there is no abnormally low tear secretion.

Table 3. Chemical analyses of the stimulated parotid saliva

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Unit</th>
<th>Values (M ± SD)</th>
<th>Psoriatics</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na⁺</td>
<td>mmol/l</td>
<td>37.7 ± 23.4*</td>
<td>25.6 ± 19.3</td>
<td></td>
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<tr>
<td>K⁺</td>
<td>mmol/l</td>
<td>25.10 ± 3.8</td>
<td>24.8 ± 3.8</td>
<td></td>
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<tr>
<td>Cl⁻</td>
<td>mmol/l</td>
<td>28.90 ± 13.8</td>
<td>27.0 ± 12.6</td>
<td></td>
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<tr>
<td>Urea</td>
<td>mmol/l</td>
<td>3.70 ± 0.9</td>
<td>3.6 ± 1.0</td>
<td></td>
</tr>
<tr>
<td>Amylase</td>
<td>U/l</td>
<td>40,423.20 ± 14,709.9***</td>
<td>27,700.3 ± 3,886</td>
<td></td>
</tr>
<tr>
<td>IgA</td>
<td>mg/l</td>
<td>23.80 ± 7.4**</td>
<td>19.4 ± 4.5</td>
<td></td>
</tr>
<tr>
<td>IgM</td>
<td>mg/l</td>
<td>n.d.</td>
<td>n.d.</td>
<td></td>
</tr>
<tr>
<td>Lysozyme</td>
<td>mg/l</td>
<td>2.75 ± 1.9*</td>
<td>3.9 ± 2.2</td>
<td></td>
</tr>
<tr>
<td>β2-Microglobulin</td>
<td>μg/l</td>
<td>729.10 ± 446.5</td>
<td>643.2 ± 573.3</td>
<td></td>
</tr>
</tbody>
</table>

* P < 0.05  
** P < 0.01  
*** P < 0.001

Analyses of the stimulated parotid saliva are summarized in Table 3. It is readily evident that the concentrations of Na, amylase, and IgA are elevated in psoriatics, whereas the lysozyme values are below those of the controls.

Table 4 depicts the results of the chemical analyses of the lacrimal fluid. No statistically significant differences can be found between the two series studied.

In Table 5, β2-microglobulin is related to IgA and lysozyme in saliva. In both series, statistically significant correlations were obtained between β2/IgA and β2/lysozyme. Similarly Na and parotid flow rates show significant correlation in both series.

Discussion

In patients with definite salivary gland involvement by SS (due to rheumatoid arthritis), parotid saliva shows elevated levels of β2-microglobulin, IgA, and lysozyme [25]. In such patients, as well as in the healthy controls, significant correlations between IgA, β2-microglobulin, and lysozyme were found [25]. Na values were dependent on the flow rate in healthy subjects, but not in patients with rheumatoid arthritis [25]. Due to the suggested predisposition of psoriatics to mild, subclinical SS [28, 29], and due to the failure to find morphological evidence for this [26], it seemed logical to see whether chemical analyses of the saliva and lacrimal fluid would disclose any disturbances lending...