Changes of serum TNF-alpha, IL-2 and IL-13 in patients with rheumatoid arthritis

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Objective: To explore the changes of serum TNF-alpha, IL-2 and IL-13 in patients with rheumatoid arthritis (RA).

Methods: A total of 60 patients with rheumatoid arthritis admitted to our hospital from December 2016 to December 2017 were selected as the observation group, and another 60 healthy people in the same period were selected as the control group. Enzyme-linked immunosorbent assay (ELISA) double antibody sandwich method was used to detect the changes of serum TNF-α, IL-2 and IL-13 in the observation group before and after treatment, and was correlated with rheumatoid arthritis disease activity index, plasma ESR, CRP level and DAS28 score. Results: before treatment, serum TNF-α, IL-2 alpha and IL-13 were significantly higher than those in the control group, the observation group of serum TNF-α, IL-2 and IL-13 levels were significantly lower than those before treatment, and compared with the control group, the difference was not statistically significant. Before treatment, the changes of serum TNF-α alpha, IL-2 and IL-13 during the onset of rheumatoid arthritis were positively correlated with the level of plasma ESR, CRP and DAS28. Conclusions: the serum levels of TNF-α, IL-2 and IL-13 in rheumatoid arthritis patients are significantly increased, and are closely related to the activity of rheumatoid arthritis. Patients can be effectively improved after treatment, which is worthy of clinical reference.

1. Introduction

As a complex system of chronic autoimmune disease, rheumatoid arthritis (RA) is cartilage synovial inflammation, caused by a defective gene autoantibody production, environmental and genetic factors of the occurrence and development of the relationship between the outcome of disease and self body immune function disorder closely[1]. CD4+T cell mediated autoimmune response plays a significant role in the pathogenesis of rheumatoid arthritis, that is, CD4+T cell related HLA-DR4/DR1 expression is increased[2]. At present, it is widely believed that CD4+T cells can be divided into two subgroups of Th1 and Th2. Cytokines such as IL-2, IFN-γ, IL-12 and TNF- alpha are mainly secreted by Th1 cells. T-bet is its specific transcription factor, while IL-5, IL-4, IL-10, IL-6 and IL-13 are mainly secreted by the cells of the killer cells. Once the Th1 or Th2 cells take advantage of the body, it can lead to the occurrence of rheumatoid arthritis[5]. As reported in the literature, the dominant status of Th1 cells is more common, that is, the secretion of TNF-α and IFN-γ, and IL-13 and IL-4 to reduce[6]. Therefore, we specially discuss the changes of serum TNF-α, IL-2 and IL-13 in patients with rheumatoid arthritis, and provide reference for clinical diagnosis and treatment.

2. Materials and methods

2.1. General information

A total of 60 cases of rheumatoid arthritis admitted to our hospital from December 2016 to December 2017 were selected as the observation group. Another 60 healthy people in the same period were selected as control group. The patients in the observation group were in accordance with the classification diagnostic criteria of RA of the American Rheumatology Society in 2010. The observation
group consisted of 21 males and 39 females, aged 16-75 years, with an average age of (52±18) years. The duration of the disease was 3-80 months, and all patients were excluded from other rheumatic diseases. There was no significant difference between the two groups in the general information of sex and age (P>0.05), which was comparable. All patients and their families have authorized and signed the informed consent, and the study has been passed by the hospital ethics committee.

2.2. Method

Enzyme-linked immunosorbent assay (ELISA) double antibody sandwich method was used to detect the changes of serum TNF-α, IL-2 and IL-13 in the observation group before and after treatment, and the correlation with rheumatoid arthritis disease activity index, plasma ESR, CRP level and DAS28 score were also analyzed. A total of 7-8 mL heparin anticoagulant in the morning were taken, centrifuged for 10 min (1 500 r/min). Then plasma was collected, and stored at -80℃ centigrade refrigerator for preservation. Erythrocyte sedimentation rate (ESR) was measured by using Westergren method detection, C reactive protein (CRP) by immune turbidimetry, equipment using Hitachi 7600 automatic biochemical analyzer. The detection of plasma TNF-α, IL-2 and IL-13 were detected by ELISA, and the kit was purchased in Hangzhou Association Biotechnology Co., Ltd. ThermoMultiskanMK3 type microplate, the OD value for the vertical, 630/450 nm dual wavelength determination OD, standard concentration as abscissa, draw standard curve and the sample concentrations was calculated.

2.3. Statistical method

Data analysis was performed by SPSS 19 software, the paired t test for group measurement data, the sample t test for measurement data between groups, χ² test for count data rate (%), with P<0.05 as the significant difference.

### Table 1.
Changes in serum TNF-α, IL-2 and IL-13 (+ s) before and after treatment in the two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>TNF-α (pg/mL)</th>
<th>IL-2 (pg/mL)</th>
<th>IL-13 (pg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>60</td>
<td>Before treatment</td>
<td>428.42±126.67</td>
<td>544.30±250.57</td>
<td>5.89±3.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>395.56±48.19</td>
<td>429.74±103.46</td>
<td>3.73±0.87</td>
</tr>
<tr>
<td>Control group</td>
<td>60</td>
<td>Before treatment</td>
<td>382.09±61.89</td>
<td>437.34±112.18</td>
<td>3.23±0.62</td>
</tr>
</tbody>
</table>

Note: compared with the control group P<0.05; compared with before treatment P<0.05; compared with the control, P>0.05.

### Table 2.
Changes of serum TNF-α, IL-2 and IL-13 correlated with the level of plasma ESR, CRP and DAS28

<table>
<thead>
<tr>
<th>Relevance</th>
<th>TNF-α</th>
<th>IL-2</th>
<th>IL-13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
<td>R</td>
</tr>
<tr>
<td>ESR</td>
<td>0.372</td>
<td>0.040</td>
<td>0.394</td>
</tr>
<tr>
<td>CRP</td>
<td>0.591</td>
<td>0.001</td>
<td>0.556</td>
</tr>
<tr>
<td>DAS28</td>
<td>0.607</td>
<td>0.000</td>
<td>0.679</td>
</tr>
</tbody>
</table>

3. Results

3.1. Changes of serum TNF-α, IL-2 and IL-13 in the two groups before and after treatment

Before treatment, patients in the observation group of serum TNF-α, IL-2 and IL-13 were significantly higher than the control group (P<0.05), the observation group of serum TNF-α, IL-2 and IL-13 levels were significantly lower than those before treatment (P<0.05), and compared with the control group, the difference was not statistically significant (P>0.05) (Table 1).

3.2. Correlation analysis of serum TNF-α, IL-2, IL-13 and disease activity index before treatment

Before treatment, the changes of serum TNF-α, IL-2 and IL-13 during the onset of rheumatoid arthritis were positively correlated with the level of plasma ESR, CRP and DAS28 (P<0.05) (Table 2).

4. Discussion

At present, the incidence of rheumatoid arthritis in China is about 0.3%-0.6%, and the main clinical characteristics are arthritis, degeneration and progressive dysfunction. If there is no effective treatment, it can seriously affect the quality of life[7]. Therefore, for rheumatoid arthritis, early diagnosis and early treatment can effectively reduce the economic burden and physical pain of the patients. There are many laboratory serological indicators for rheumatoid arthritis, and cytokine is an important inflammatory factor[8] that leads to synovitis and joint injury. At present, there are many cytokines related to rheumatoid arthritis, such as TNF-α, IL-2 and IL-13, among which the research on TNF-α is the most deeply and most. TNF-alpha stimulates osteoclast and stromal cells to express nuclear factor kappa B receptor activating factor ligand
It is also considered that TNF-α is mainly synthesized by macrophages, and the serum TNF-α in patients with active rheumatoid arthritis is significantly higher than that in the inactive phase[11]. Therefore, TNF-α can not only judge whether the disease is or not, but also differentiate the incidence of rheumatoid arthritis.

In this study, patients in the observation group of serum TNF-α, IL-2 and IL-13 levels before treatment were significantly higher than control group (P<0.05), the observation group of serum TNF-α, IL-2 and IL-13 levels were significantly lower than those before treatment (P<0.05), and compared with the control group, the difference was not statistically significant (P>0.05). Some studies are similar to the results in this paper. They believe that the use of TNF-α antagonists can effectively prevent bone mineral density of hip and lumbar vertebrae from decreasing, and thus achieve a good effect on rheumatoid arthritis.

To sum up, the serum levels of TNF-α, IL-2 and IL-13 in rheumatoid arthritis patients are significantly increased, and are closely related to the disease activity of rheumatoid arthritis patients. After treatment, the patients can be effectively improved, which is worthy of clinical reference.