Expression level of TGF-β1, U-II in patients with bronchial asthma

Shang-Sun Cai¹, Guo-Ping Wu²*, Yuan-Zheng Yang², Ping Rao², Guang-Yu Wang², Qiong-Lian Huang²

¹Center Health Hospital of Changliu, Haikou 570312, China
²Affiliated Hospital of Hainan Medical University, Haikou 570102, China

1. Introduction

Bronchial asthma is a common disease of respiratory system. It is characterized as recurrent paroxysmal asthma, dyspnea, chest distress or cough etc. Recently, the morbidity and mortality of bronchial asthma are increasing. It is reported that the incidence of adult bronchial asthma is 1.2%-25.5%[1]. At present, imbalance of cytokine excreted by Th1/Th2 cell is regarded as the important pathogenesis. Transforming growth factor-β1 (TGF-β1) is a multifunction regulatory cytokine, and plays an important role in immune regulation, cell growth, cell differentiation, synthesis and preservation of extracellular matrix. Urotensin-II (U-II) can shrink respiratory tract and pulmonary vessels, and promote proliferation of smooth muscle in airway and pulmonary artery. So far, no study on correlation between TGF-β1 and U-II has been reported. We measured TGF-β1 and U-II by ELISA and radioimmunoassay, respectively to explore the correlation between them.

2. Materials and methods

2.1. Clinical data

All patients visiting from March 2009 to November 2014 met the standard of diagnosis and treatment guideline[2]. Subjects complicated with severe diseases such as diseases of heart, liver, kidney or hematopoietic system; during pregnancy or breastfeeding period, or with immune stimulant or systematic treatment were excluded. There were three groups: acute bronchial asthma group, including 27 males and 18 females, aged 37-79 years old, with average age as (48.2±6.5) years old; bronchial asthma during remission period group, including 24 males and 19 females, aged 36-80 years old, with average age as (47.5±7.1) years old; and control group, including 22 males and 19 females, aged 38-82 years old, with average age as (49.3±7.5) years old. And there was no significant difference in age or gender (P>0.05). All subjects signed the informed consent.

Objective: To investigate the expression level in the serum of patients with bronchial asthma in TGF-β1, U-II and their correlation. Methods: U-II was measured by radioimmunoassay and TGF-β1 was measured by double antibody sandwich ELISA method in 45 patients with acute bronchial asthma, 43 cases of bronchial asthma in remission period and 41 healthy subjects. The correlation between TGF-β1 and U-II was also analyzed. Results: There were significant differences in TGF-β1 and U-II between healthy subjects and bronchial asthma patients (P<0.01), and the differences between patients at acute stage and remission stage was also significant (P<0.01). TGF-β1 was positively correlated with U-II (P<0.05). Conclusions: TGF-β1 and U-II are important indicators for treatment of bronchial asthma.

2.2. Treatment method

ELISA for TGF-β1 and radioimmunoassay for U-II were provided by Yiding Biological Agent Limited Company in Hainan. A total of 5 mL venous blood was extracted under fasting. The plasma was extracted by centrifuge, and preserved in refrigerator. U-II was measured by radioimmunoassay and TGF-β1 was measured by double antibody sandwich ELISA method according to the instruction.
2.3. Statistical analysis

All data were expressed as mean±SD. They were analyzed by SPSS 15.0 and t test. The correlation was analyzed by Pearson analysis. The difference was considered as significant if \( P<0.05 \).

3. Results

3.1. TGF-\( \beta \)1 and U-\( \parallel \) levels

There were significant differences in TGF-\( \beta \)1 and U-\( \parallel \) between healthy subjects and bronchial asthma patients \( (P<0.01) \), and the differences between patients at acute stage and remission stage was also significant \( (P<0.01) \) (Table 1).

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>TGF-( \beta )1 (ng/mL)</th>
<th>U-( \parallel ) (pmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute stage</td>
<td>45</td>
<td>31.26±8.27</td>
<td>5.15±1.04</td>
</tr>
<tr>
<td>Remission stage</td>
<td>43</td>
<td>9.51±2.19*#</td>
<td>3.88±1.21*#</td>
</tr>
<tr>
<td>Control group</td>
<td>41</td>
<td>3.46±0.83</td>
<td>2.32±0.34</td>
</tr>
</tbody>
</table>

*Compared with control group, \( P<0.01 \); #Compared with acute stage, \( P<0.01 \).

3.2. Correlation analysis

Pearson analysis showed that TGF-\( \beta \)1 was positively correlated with U-\( \parallel \) \( (P<0.05) \).

4. Discussion

Lung is an organ with respiratory tract circulation and body circulation. When asthma occurs, inflammatory cell, locally infiltrated eosinophil fibroblast, airway epithelial cell, endothelial cell and bronchial fibroblast in airway wall are expressed, which participate in airway remodeling via various pathways. Many scholars believe that TGF-\( \parallel \)1 has double regulation function. On one hand, it affects inflammatory cell to participate in initiation of inflammation and immune reaction of airway; on the other hand, it can promote proliferation of fibrocyte, then induce airway epithelium fibrosis, airway remodeling, increased airway responsiveness, thickened airway wall and decreased pulmonary function\( (3-5) \). Many researchers have studied on the relationship between TGF-\( \beta \)1 and asthma, and drew different conclusions. We found that TGF-\( \beta \)1 of patients with bronchial asthma were significantly higher than that of control group \( (P<0.01) \), and the level was significantly higher in acute period group \( (P<0.01) \), which is consistent to some studies\( (12-15) \). U-\( \parallel \) may take part in airway remodeling, which need vessel contraction active substances and related regulatory factors. In our study, it also shows that TGF-\( \beta \)1 is positively correlated with U-\( \parallel \) \( (P<0.05) \), which is similar to study of Liang et al\( (16) \).

References