Clinical studies of simvastatin in treatment of adult-onset obesity with asthma.

Shufang Sun¹, Wei Han², Wanming Hao²*

¹Blood Donation Service Department, Qingdao Blood Center, Qingdao, Shandong, PR China
²Department of Respiratory, Qingdao University, Qingdao Municipal Hospital, Qingdao, Shandong, PR China

Abstract

Objective: To explore clinical value and significance of simvastatin in treatment of adult-onset obesity with asthma.

Methods: 82 cases of adult-onset obesity with asthma enrolled in Qingdao Municipal Hospital from Jun 2015 to Aug 2016 were selected as the study objects and randomly divide them into control group and experiment group with 41 cases each. The patients in the control group were treated with budesonide and formoterol inhalation therapy while simvastatin treatment was added in the experiment group in addition to the above therapy. Then, we evaluate Asthma Control Test (ACT) of the two groups before and after treatment within 55 d, compare the patient’s pulmonary function recovery and observe serum leptin level of the two groups, record side effects and then compare the life quality of the patients.

Results: With different treatment schemes, the ACT score, pulmonary function recovery level, serum leptin level, life quality of the patients turn out to be better in both two groups, while the effects in experimental groups were more excellent with a statistical significance (P<0.05); but no obvious side effects were found.

Conclusion: Simvastatin has good effect in treatment of obese adults with asthma on improving lung function, reducing the patient’s serum leptin level, decreasing the incidence of adverse reactions, and improving the quality of life of the patients.

Keywords: Simvastatin, Obesity, Asthma, Pulmonary function.
**Treatment methods**

Asthma treatment was conducted as usual in the control group that is to continue the previous treatment of budesonide, formoterol or salmeterol and fluticasone propionate inhalation treatment, inhaling twice a day with once inhalation for each. Oral simvastatin was added in the experiment group based on routine treatment once a day with the dosage of 20 mg for each.

**Detection methods**

5 ml blood sample was collected in tubes for venous blood specimen in fasting time for serum leptin test and set the radius of the centrifuge as 10 cm at the centrifugal rate of 2000 r/m. Detect the patient's serum leptin level by double antibody sandwich method.

**Clinical observation index**

**ACT score**: Evaluate the patient’s control of asthma with ACT score system and the score results are positively correlated with patient’s control of asthma; evaluate the pulmonary function before and after the treatment, including the Forced Expiratory Volume (FEV1) and Forced Vital Capacity (FVC) at first second; detect the patient's serum leptin level; detect drug adverse reactions; the scores of life quality include the patient’s performance of physical function, emotional function, social function and mental function.

**Statistical analysis**

Count data was described as percentage (n, %) and measurement data as mean ± S. Chi-square test and T-test, \( \chi^2 \) test were applied with statistical significant of \( P<0.05 \). Statistical software: SPSS 19.0 and Microsoft office excel.

**Results**

**Comparison of ACT score, pulmonary function and serum leptin level**

With different treatment schemes, the ACT score, pulmonary function recovery level, serum leptin level, life quality of the patients turn out to be better in both two groups, while the effects in experimental groups were more excellent with a statistical significance (Table 1).

**Drug adverse reactions**

There is no significant difference in drug adverse reactions after treatment between the two groups (Table 2).

**Quality of life scores**

The quality of life scores after treatment in the experiment group are obviously higher than those of the control with statistical significance (\( P<0.05 \)) (Table 3).

**Table 1. Comparison of ACT score, pulmonary function and serum leptin level.**

<table>
<thead>
<tr>
<th>Index</th>
<th>Experiment group</th>
<th>Control group</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before treatment</td>
<td>18.2 ± 3.01</td>
<td>17.5 ± 2.97</td>
<td>1.06</td>
<td>0.29</td>
</tr>
<tr>
<td>After treatment</td>
<td>23.4 ± 2.41</td>
<td>20.7 ± 2.16</td>
<td>5.34</td>
<td>0</td>
</tr>
<tr>
<td>FEV1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before treatment</td>
<td>1.55 ± 0.75</td>
<td>1.54 ± 0.73</td>
<td>0.61</td>
<td>0.95</td>
</tr>
<tr>
<td>After treatment</td>
<td>1.99 ± 0.45</td>
<td>1.62 ± 0.51</td>
<td>3.49</td>
<td>0</td>
</tr>
<tr>
<td>FVC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before treatment</td>
<td>2.18 ± 0.51</td>
<td>2.16 ± 0.48</td>
<td>0.18</td>
<td>0.86</td>
</tr>
<tr>
<td>After treatment</td>
<td>2.86 ± 0.43</td>
<td>2.23 ± 0.35</td>
<td>7.28</td>
<td>0</td>
</tr>
<tr>
<td>Serum leptin level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before treatment</td>
<td>13.7 ± 1.31</td>
<td>13.2 ± 1.28</td>
<td>1.75</td>
<td>0.08</td>
</tr>
<tr>
<td>After treatment</td>
<td>11.5 ± 1.05</td>
<td>14.7 ± 1.32</td>
<td>12.15</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 2. Comparison of drug adverse reactions (n, %).**

<table>
<thead>
<tr>
<th>Group</th>
<th>Gastrointestinal reaction</th>
<th>Elevated aminotransferase alanine</th>
<th>Elevated aminotransferase aspartate</th>
<th>Total adverse reaction rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment group</td>
<td>1 (0.24%)</td>
<td>1 (0.24%)</td>
<td>0 (0.00%)</td>
<td>2 (4.88%)</td>
</tr>
<tr>
<td>Control group</td>
<td>1 (0.24%)</td>
<td>2 (0.48%)</td>
<td>1 (0.24%)</td>
<td>4 (9.76%)</td>
</tr>
<tr>
<td>( \chi^2 )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.719</td>
</tr>
<tr>
<td>P</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.396</td>
</tr>
</tbody>
</table>
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Table 3. Comparison of quality of life scores.

<table>
<thead>
<tr>
<th>Group</th>
<th>Physical function</th>
<th>Emotional function</th>
<th>Social function</th>
<th>Mental function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment group</td>
<td>92.13 ± 3.48</td>
<td>91.14 ± 3.17</td>
<td>93.33 ± 3.48</td>
<td>92.38 ± 3.39</td>
</tr>
<tr>
<td>Control group</td>
<td>88.12 ± 2.05</td>
<td>85.15 ± 2.65</td>
<td>86.03 ± 2.18</td>
<td>87.18 ± 2.58</td>
</tr>
<tr>
<td>t</td>
<td>6.357</td>
<td>9.283</td>
<td>11.383</td>
<td>7.816</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Conclusion

Simvastatin has good effects in treatment of obese adults with asthma and needs more case studies in clinic for the further research.

Discussion

Asthma and inflammation diseases among the obese people are different from those among the ordinary patients with more severe clinical manifestations, conventional treatment of asthma in obesity has poor prognosis, so obesity becomes a special phenotype of asthma in clinic [7-10].

Statins has the effect of anti-inflammatory and immune regulation. Simvastatin is a competitive inhibitor of Hydroxymethylglutaryl-CoA reductase (NADPH) with good inhibition of cholesterol biosynthesis for patients and accelerates metabolism and decomposition of low density lipoprotein [11-13]. In clinical researches, simvastatin is mainly used in the treatment of cardiovascular and hyperlipidaemia disease and foreign related research results also shows that the application of statins in asthma therapy can reduce the incidence of acute asthma and hormone dosages. But there are no clear research results in the simvastatin’s application effects in the treatment of bronchial asthma [14-17].

Adipose tissue of obese patients produces inflammatory factors and cytokines, results in decreasing of the immune system tolerance and then raising the risk of asthma [18]. Obesity tissue will play a role in airway inflammation of asthma through its fat factor with the regulation of fat metabolism, which may become the new targets for the treatment of asthma with obesity [19].

With a large number of clinical studies, some experts indicate that statins inhibit the progression of airway inflammation in such approaches as MAPK pathway and pathway of small G-protein and nuclear factor-kB to inhibit allergic reaction of inflammation, reduce the release of cytokines and aggregation of acidophilic granulocyte or inhibit the secretion and release of interleukin 5, thus relieving disease conditions by alleviating the patient’s airway inflammation response [20,21].

The increase of serum leptin level suggests a metabolic disorder and serves as a pathological basis for systemic inflammatory response, under normal circumstances, however, the obese have a higher level of serum leptin than the ordinary with normal body mass. Leptin in lung tissue and its receptor have good inhibitory effects in neutrophil apoptosis through MAPK pathway and also promote cytokines release of inflammatory cells [22].

With different treatment schemes, the patients of the two groups turn out to get better in ACT score, pulmonary function recovery and serum leptin level. Quality of the effects of the experiment group patients is more significant and excellent with a statistical significance. This suggests this method could be a novel and efficient treatment method in clinic.

References


*Correspondence to
Wanming Hao
Department of Respiratory
Qingdao University
Qingdao Municipal Hospital
Shandong PR China