Effect of rosuvastatin on the serum lipid and inflammatory cytokines in patients with diabetes and hypercholesteremia

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ABSTRACT

Objective: To explore the effect of rosuvastatin on the blood glucose, blood lipid, inflammatory cytokines, and liver function in patients with diabetes and hypercholesteremia. Methods: A total of 108 patients with diabetes and hypercholesteremia who were admitted in our hospital were included in the study and randomized into the treatment group and the control group with 54 cases in each group. The patients in the treatment group were given rosuvastatin, while the patients in the control group were given atorvastatin. The patients in the two groups were continuously treated for 8 weeks. The blood glucose, blood lipid, inflammatory cytokines, and liver function in the two groups were detected and compared. Results: FBG, PBG, CRP, and IL-6 levels after treatment in the two groups were significantly reduced when compared with before treatment, and those in the treatment group were significantly lower than those in the control group. TC, TG, and LDL-C levels after treatment in the two groups were significantly reduced when compared with before treatment, while HDL-C level was significantly elevated when compared with before treatment. The comparison of TC and LDL-C levels between the two groups was not statistically significant. The comparison of AST, ALT, and CK levels before and after treatment between the two groups was not statistically significant. Conclusions: Rosuvastatin in the treatment of diabetes and hypercholesteremia can effectively reduce the blood glucose and blood lipid levels, and improve the inflammatory cytokines, with a significant effect; therefore, it deserves to be widely recommended in the clinic.

1. Introduction

Diabetes is a metabolic disease mainly characterized by hyperglycemia caused by insulin secretion defect[1]. Hypercholesteremia is a common complication of diabetes. With no timely and effective treatments, heart, vessels, kidney, and nerves are easy to be involved, and even dysfunction will occur, which can severely affect the patients’ living quality[2-3]. Some researches demonstrate that[4-5] the lipid regulation effect of rosuvastatin is superior to that by other statins. The study is aimed to explore the effect of rosuvastatin on the blood glucose, blood lipid, inflammatory cytokines, and liver function in patients with diabetes and hypercholesteremia.

2. Materials and methods

2.1. Clinical materials

A total of 108 patients with diabetes and hypercholesteremia who were admitted in our hospital from August, 2014 to April, 2016 were included in the study, among which 57 were male, and 51 were female; aged from 29 to 72 years old, with an average age of (55±7) years old; 48 were mild, 51 were moderate, and 9 were severe. All the patients were in accordance with the related diagnostic criteria of diabetes and hypercholesteremia in the Chinese Adult dyslipidemia Prevention and Treatment Guideline[6], with LDL-C ≥ 3.37 mmol/L. Exclusion criteria: (1) those who were allergic to rosuvastatin; (2) those who had angioplasty, unstable angina, and myocardial infarction in recent 3 months; (3) those who were accompanied by
acute heart failure; (4) those who were merged with severe liver, kidney, and mental disorders; (5) those who were pregnant, at the lactation period or 6 months after delivery.

2.2. Methods

The patients were randomized into the treatment group and the control group with 54 cases in each group. The comparison of gender, age, and condition between the two groups was not statistically significant (P>0.05), and it was comparable. The patients in the two groups were given glucose control, diet guiding, body weight control, appropriate exercise, and other routine treatments. On the routine treatments, the patients in the treatment group were given rosuvastatin calcium tablets (produced by AstraZeneca UK Limited, Approval No. J20160025, 10 mg), 10 mg/time, 1 time/d, while the patients in the control group were given atorvastatin calcium tablets (produced by Pfizer, Approval No. H20051407, 10 mg), 10 mg/time, 1 time/d, continuously for 8 weeks.

2.3. Observation indicators

A volume of 3 mL morning fasting venous blood before and after treatment in the two groups was collected, centrifuged, and preserved at -80 °C. The full automatic biochemical analyzer was used to detect the blood glucose indicators before and after treatment in the two groups, including FBG and BGP; blood lipid indicators, including TC, TG, HDL-C, and LDL-C; liver function indicators, including AST, ALT, and CK; and inflammatory cytokines, including CRP and IL-6.

2.4. Statistical analysis

SPSS 18.0 software was used for the statistical analysis. The measurement data were expressed as mean ± SD. The paired t test was used for the intra-group comparison, while the independent t test was used for the comparison between the two groups. P<0.05 was regarded as statistically significant.

3. Results

3.1. Comparison of the blood glucose level before and after treatment between the two groups

The comparison of FBG and PBG before treatment between the two groups was not statistically significant (P>0.05). FBG and PBG levels after treatment in the two groups were significantly reduced when compared with before treatment (P<0.05). FBG and PBG levels after treatment in the treatment group were significantly lower than those in the control group (P<0.05) (Table 1).

Table 1.
Comparison of the blood glucose level before and after treatment between the two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>FBG</th>
<th>PBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>54</td>
<td>Before treatment</td>
<td>7.42±0.81</td>
<td>11.48±1.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>5.83±0.98</td>
<td>8.65±0.97</td>
</tr>
<tr>
<td>Control</td>
<td>54</td>
<td>Before treatment</td>
<td>7.39±0.82</td>
<td>11.37±1.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>6.27±1.12</td>
<td>9.25±0.86</td>
</tr>
</tbody>
</table>

*P<0.05, when compared with before treatment; #P<0.05, when compared with the control group.

3.2. Comparison of the blood lipid indicators before and after treatment between the two groups

The comparison of TC, TG, and LDL-C levels before treatment between the two groups was not statistically significant (P>0.05). TC, TG, and LDL-C levels after treatment in the two groups were significantly reduced when compared with before treatment (P<0.05), while HDL-C level was significantly elevated when compared with before treatment (P<0.05). TC and LDL-C levels after treatment in the treatment group were significantly lower than those in the control group (P<0.05) (Table 2).

Table 2.
Comparison of the blood lipid indicators before and after treatment between the two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>TC</th>
<th>TG</th>
<th>HDL-C</th>
<th>LDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>54</td>
<td>Before treatment</td>
<td>6.86±0.83</td>
<td>2.81±0.87</td>
<td>1.23±0.26</td>
<td>4.01±0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>4.10±0.78</td>
<td>1.86±0.84</td>
<td>1.34±0.36</td>
<td>2.55±0.32</td>
</tr>
<tr>
<td>Control</td>
<td>54</td>
<td>Before treatment</td>
<td>6.85±0.79</td>
<td>2.80±0.88</td>
<td>1.23±0.24</td>
<td>4.05±0.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>4.95±0.76</td>
<td>1.84±0.85</td>
<td>1.36±0.38</td>
<td>2.71±0.35</td>
</tr>
</tbody>
</table>

*P<0.05, when compared with before treatment; #P<0.05, when compared with the control group.

3.3. Comparison of the liver function indicators before and after treatment between the two groups

The comparison of AST, ALT, and CK levels before treatment between the two groups was not statistically significant (P>0.05), the above indicators after treatment were slightly elevated, but the comparison was not statistically significant (P>0.05). The comparison of AST, ALT, and CK levels after treatment between the two groups was not statistically significant (P>0.05) (Table 3).

Table 3.
Comparison of the liver function indicators before and after treatment in the two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>AST</th>
<th>ALT</th>
<th>CK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>54</td>
<td>Before treatment</td>
<td>24.13±0.86</td>
<td>22.45±0.78</td>
<td>129.85±13.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>24.92±1.13</td>
<td>23.36±1.12</td>
<td>131.28±15.01</td>
</tr>
<tr>
<td>Control</td>
<td>54</td>
<td>Before treatment</td>
<td>24.09±0.88</td>
<td>22.39±0.82</td>
<td>130.01±12.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>24.87±1.21</td>
<td>23.45±1.07</td>
<td>132.11±14.20</td>
</tr>
</tbody>
</table>

3.4. Comparison of the inflammatory cytokines before and after treatment between the two groups

The comparison of CRP and IL-6 levels before treatment between the two groups was not statistically significant (P>0.05), the above indicators after treatment were slightly elevated, but the comparison was not statistically significant (P>0.05). The comparison of CRP and IL-6 levels after treatment between the two groups was not statistically significant (P>0.05).
the two groups was not statistically significant ($P>0.05$). CRP and IL-6 levels after treatment in the two groups were significantly reduced when compared with before treatment ($P<0.05$). CRP and IL-6 levels after treatment in the treatment group were significantly lower than those in the control group ($P<0.05$) (Table 4).

Table 4.
Comparison of the inflammatory cytokines before and after treatment between the two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>CRP</th>
<th>IL-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>54</td>
<td>Before treatment</td>
<td>0.37±0.11*</td>
<td>64.62±6.84*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>0.21±0.09*</td>
<td>56.95±5.43*</td>
</tr>
<tr>
<td>Control</td>
<td>54</td>
<td>Before treatment</td>
<td>0.35±0.10*</td>
<td>65.01±6.79*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>0.32±0.06*</td>
<td>58.94±5.36*</td>
</tr>
</tbody>
</table>

$P<0.05$, when compared with before treatment; $P<0.05$, when compared with the control group.

4. Discussion

Hypercholesteremia is a common complication of diabetes, with clinical manifestations of elevated cholesterol and TG levels, being merged with atherosclerosis, coronary heart disease, and other chronic cardiovascular disease, and has been one of the main reasons for developing death in patients with diabetes[7-9]; therefore, positive and effective lipid-lowering therapy has been the hot issue for improving the prognosis in patients with diabetes and hypercholesteremia. Rosuvastatin belongs to the reductase inhibitor of selective and endogenous cholesterol HMG-CoA, is the first-line treatment drug in reducing the serum lipid, can block the synthesis of endogenous cholesterol, eliminate the synthetized cholesterol, and effectively reduce the serum lipid level[10,11]; meanwhile, rosuvastatin can also increase LDL receptor amount on the liver cell membrane surface, accelerate the absorption and catabolism of LDL, inhibit the synthesis of VLDL in the liver, promote HDL-C secretion, and reduce VLDL and LDL amount in order to reach the goal of reducing LDL-C and TC levels[12-14]. The results in the study showed that FBG, PBG, TC, TG, and LDL-C levels after treatment in the two groups were significantly reduced when compared with before treatment, while HDL-C level was significantly elevated when compared with before treatment ($P<0.05$); moreover, FBG, PBG, TC, TG, and LDL-C levels after treatment in the treatment group were significantly lower than those in the control group ($P<0.05$), which can be explained by that due to no requirement of CYP450 3A4 metabolism, the mutual effect of drugs is reduced; meanwhile, rosuvastatin can effectively reduce the blood glucose and blood lipid levels, and improve the inflammatory cytokines, with a significant effect; therefore, it deserves to be widely recommended in the clinic.

References