Lipid Lowering Activity of Lercanidipine in Hyperlipidemic Rats

K. PRASANNA KUMAR, A. RAMA NARSIMHA REDDY, Y. NARSIMHA REDDY and J. ANBU

For author affiliations, see end of text.
Received April 15, 2009; Revised November 29, 2009; Accepted February 22, 2010

This paper is available online at http://ijpt.iums.ac.ir

ABSTRACT
The present study was aimed at evaluating the lipid lowering activity of lercanidipine, a calcium channel blocker, in standard diet induced hyperlipidemic rats. Hyperlipidemic rats were divided into different groups and were treated with daily oral dose of lercanidipine and atorvastatin for 7 days. On 8th day, blood samples were collected and analyzed for serum lipid levels using commercial kits. The effect of lercanidipine on lipid profiles in hyperlipidemic rats was estimated. Like atorvastatin, a standard lipid lowering drug, lercanidipine reduced the cholesterol, triglycerides and low density lipoprotein levels. These findings suggest that anti-hyperlipidemic activity of lercanidipine, which may be used for the treatment of various cardiovascular diseases associated with hyperlipidemia.

Keywords: Lercanidipine, Lipid lowering activity, Hyperlipidemic rats, Atorvastatin
Table 1. Effect of lercanidipine on TC, TG, LDL and HDL levels in plasma of Control and Experimental rats

<table>
<thead>
<tr>
<th>Parameters</th>
<th>TC</th>
<th>TG</th>
<th>LDL</th>
<th>HDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I: Normal rats</td>
<td>83.16 ± 2.71</td>
<td>123.5 ± 2.16</td>
<td>21.3 ± 1.76</td>
<td>32.16 ± 3.06</td>
</tr>
<tr>
<td>Group II: HL Control</td>
<td>179.16 ± 3.97b</td>
<td>264.5 ± 9.48b</td>
<td>74.16 ± 5.13b</td>
<td>56.5 ± 1.64b</td>
</tr>
<tr>
<td>Group III: Lercanidipine Treated rats (20 mg kg-1)</td>
<td>109.83 ± 1.47a</td>
<td>136 ± 1.54a</td>
<td>34.66 ± 1.21a</td>
<td>64.83 ± 0.75a</td>
</tr>
<tr>
<td>Group IV: Atorvastatin Treated rats</td>
<td>105.66 ± 1.63a</td>
<td>119.83 ± 0.72a</td>
<td>25.5 ± 1.37a</td>
<td></td>
</tr>
</tbody>
</table>

Values are in mean ± SD; Number of animals in each group =6; a= p < 0.001 Vs Group II, b= p < 0.001 Vs Group I

**Anti-hyperlipidemic studies**

The hyperlipidemic rats were divided into three groups of six rats each. **Group I**: Normal rats received a dose of 1.5% carboxy methyl cellulose (CMC) (p.o), **Group II**: Control hyperlipidemic (HL) rats received a dose of 1.5% CMC (p.o), **Group III**: HL rats received a daily oral dose of lercanidipine (20mg/kg) suspended in 1.5% CMC and **Group IV**: HL rats received a daily oral dose of atorvastatin 40mg/kg. This study was carried out for 7 days. The protocol of the present study was approved [No: 09/IRB/VCP/2005] by the institutional animal ethical committee, Vel’s College of Pharmacy, Chennai, India.

**Collection of Blood samples**

On the 8th day, blood was collected by retro orbital sinus puncture, under mild ether anaesthesia. Plasma was obtained by immediate centrifugation of blood samples using REMI ULTRA cooling centrifuge at 3000 rpm for 5 minutes at room temperature. All samples were stored at 4°C until analysis.

**Biochemical analysis**

Plasma lipid levels include TC, TG and HDL-C were measured [6] using respective diagnostic commercial kits from Qualigens diagnostics, Mumbai, India and LDL-C in plasma was calculated as per Friedewald estimation [8,9],

\[ \text{LDL-C} = \text{TC} - \left( \frac{\text{TG}}{5} + \text{HDL-C} \right) \text{mg/dl} \]

**Statistical Analysis**

The results were expressed as mean ± SD. Statistically analysis was carried out using t-test and differences below \( p<0.05 \) implied as statistically significant.

**RESULTS**

The effect of lercanidipine on plasma lipids in hyperlipidemic rats was shown in table 1. The rats of Group II, hyperlipidemic control showed a marked increase in plasma TC, LDL-C, and TG and a fall in HDL-C levels than normal control group indicating the induction of hyperlipidemia. However, following treatment with lercanidipine and atorvastatin for 7 days, the plasma TC, LDL-C and TG were reduced significantly (\( p<0.05 \), while HDL-C levels were increased in treated group when compared with hyperlipidemic control group.

**DISCUSSION**

Lercanidipine, a dihydropyridine calcium-channel blocker (CCB), is used alone or with an angiotensin-converting enzyme inhibitor, to treat hypertension, chronic stable angina pectoris, and Prinzmetal's variant angina [10]. Recent clinical trials support the efficacy and safety of long-acting dihydropyridine (DHP) CCBs for a wide spectrum of hypertensive patients, including diabetic hypertensive patients [10]. Among the calcium channel blockers (CCBs), the new and highly lipophilic calcium antagonists, such as lercanidipine and lacidipine, display the most promising antiatherosclerotic activities [11]. In the present study we evaluated the effect of lercanidipine on lipid profiles in cholesterol induced hyperlipidemic rats. Surprisingly lercanidipine significantly reduces the lipid levels; i.e decreased in the plasma TC, TG, LDL levels and increased the HDL-C levels in hyperlipidemic rats. A statistically significant change in lipid profile was observed with atorvastatin and lercanidipine treatments in HL rats (\( p < 0.05 \)). The TC, TG and LDL-C content in plasma registered a significant hike in HL control group, which returned to near normal in lercanidipine treated HL rats. These observations indicate the lipid lowering potential of lercanidipine. In support of our investigations, the proposed synergistic effect of calcium channel blockers with lipid-lowering therapy in retarding progression of coronary atherosclerosis was also reported [12]. In addition to our investigations, the lipid lowering activity of calcium channel blockers were also reported by earlier studies [13,14]. This anti-hyperlipidemic activity of lercanidipine (20 mg kg-1) was comparable with atorvastatin treated groups.

**CONCLUSION**

The present investigations stated that the oral administration of lercanidipine has significantly reduced the plasma lipid levels and reversed to normal levels, thus emphasizing the protective role against standard cholesterol induced hyperlipidemia.

**REFERENCES**

3. Markku J. Savolainen, Maire Rantala, Kari Kervinen, Leea Järvi, Kaisu Suvanto, Tapio Rantal a & Y. Antero Kesäniemi,
Lipid lowering activity of lercanidipine


CURRENT AUTHOR ADDRESSES

K. Prasanna Kumar, Department of Pharmacology, Vel’s college of Pharmacy, Chennai, India.

A. Rama Narsimha Reddy, Department of Pharmacology, University College of Pharmaceutical Sciences, Kakatiya University, Warangal, India.

Y. Narsimha Reddy, Department of Pharmacology, University College of Pharmaceutical Sciences, Kakatiya University, Warangal, India. E-mail: yellu_nr@yahoo.com (Corresponding author)

J. Anbu, Department of Pharmacology, Vel’s college of Pharmacy, Chennai, India.