Antihyperlipidemic potential of a polyherbal drug (Geriforte) on atherogenic diet induced hyperlipidemia: A Comparison with Ayurslim

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ABSTRACT

We investigated the antihyperlipidemic activity of a polyherbal drug (Geriforte). The present study was undertaken to assess body weight, total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL), high density lipoprotein (HDL) and very low density lipoprotein (VLDL) potential of the polyherbal drug (Geriforte) using atherogenic diet induced hyperlipidemia. The animals were divided into four groups: normal control, hyperlipidemic control, hyperlipidemic plus Geriforte and hyperlipidemic plus Ayurslim. Hyperlipidemia was induced by treated orally with butter fat (79% standard diet +21% butter fat). Intragastric administration of Geriforte (450 mg kg⁻¹ body weight) for 8 days significantly decreased body weight, TC, TG and LDL whereas significantly increased level of HDL. Atherogenic index was lowered in the Geriforte drug fed animals when compared to hyperlipidemic animals. Geriforte exhibited quite competitive potential when compared with the reference drug Ayurslim affording a possible alternative therapeutic drug in the treatment of hyperlipidemia.

Keywords: Hyperlipidemia, Geriforte, Ayurslim, Poly herbal drug.

INTRODUCTION

Hyperlipidemia is the most prevalent indicator for susceptibility to atherosclerotic heart disease. It is characterized by abnormally elevated lipid (triglyceride and cholesterol) and lipoprotein (LDL-c, VLDL-c) levels in the blood. This is supported by an abundance of congruent result from genetic, epidemiological, experimental animal studies and clinical trials that the presence of high plasma lipid cholesterol increases the incidence of coronary heart diseases (CHD). Atherosclerosis is the preliminary lipid disorder that affects the arteries and many factors contributing to its etiology, among them diabetes, glucocorticoid, diet, psychological factors are the major one. A crucial step in the pathogenesis of atherosclerosis is believed to be oxidative modification of LDL-c [1,2,3].

The traditional medicine all over the world is now a day reviewed by an extensive research on different plant species and their therapeutic principles. As plants produce a lot of anti-oxidants to control the oxidative stress caused by sunbeams and oxygen, they can represent a source of new compounds with anti-oxidant activity [4]. Ayurveda, the Indian traditional health care system (ayus-life, vedaknowledge, meaning-science of life), is the oldest medical system in the world which exploits the potential of various herbs as drugs. In recent years, the clinical importance of herbal drugs has received considerable attention. Geriforte, an indigenous herbomineral compound, is a mixture of several herbal extracts and minerals including amla (Phyllanthus emblica Linn.), brahmi (Centella asiatica Linn.), asvagandha (Withania somnifera Dunal), haldi (Curcuma longa Linn.), bhangra (Eclipta alba Linn.), loh bhasma (iron oxide), jasad bhasma (zinc oxide), onion (Allium cepa Linn.), garlic (Allium sativum Linn.), grape (Vitis vinifera Linn.), carrot (Ducus carota Linn.) and many other herbs [5]. The preparation is being used as a restorative tonic to solve the problems of old age in India. It is reported to have health benefits including reduction in anxiety disorders [6] and age related enzymatic changes in liver and brain [7,8]. It produces a better feeling of physical and mental well being, improves appetite and digestion, maintains positive nitrogen balance and cures menopausal symptoms [7].

During the course of the study we thought it pertinent to evaluate the antihyperlipidemic and antihypercholesterolemic effects of Geriforte as these manifestations can be cause or consequence of diabetes. Since these clinical manifestations can also occur independently causing greater risk towards development of cardiovascular disorders, in the present study we have tried to evaluate the antihyperlipidemic and antihypercholesterolemic properties of Geriforte in atherogenic diet induced hyperlipidemic rats.

2. MATERIALS AND METHODS

2.1 Chemicals

Geriforte and Ayurslim herbal drug used in this study was obtained from the Himalaya Drug Company, Bangalore, India. Diagnostic kits for estimation of cholesterol (Merck), Triglyceride (Merck) and...
Table 1 Effect of Geriforte and Ayurslim on body weight after 8 days of hyperlipidemia induced by atherogenic diets in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Body weight in gm compared with weight first day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>+9.10</td>
</tr>
<tr>
<td>Control (Atherogenic diet)</td>
<td>+37.45</td>
</tr>
<tr>
<td>Geriforte (450 mg kg⁻¹ body weight)</td>
<td>- 20.42</td>
</tr>
<tr>
<td>Ayurslim (250 mg kg⁻¹ body weight)</td>
<td>-21.15</td>
</tr>
</tbody>
</table>

Values are mean ± SD of six rats from each group

High density lipoprotein (CDR Diagnostic) were purchased from Modern Scientific Company, Coimbatore, India. Atherogenic diet was purchased from local market.

2.2 Drug preparation

Geriforte (450 mg kg⁻¹ body weight) and Ayurslim (250 mg kg⁻¹ body weight) was suspended in 9 ml saline (50 mg/ml) and 5ml saline (50 mg/ml) respectively and kept for 3-4 hours at room temperature with intermittent shaking. The contents were centrifuged at 3000 rpm for 5 minutes to remove the particulate matter, supernatant was then collected and filter sterilized. The suspension was given orally with the help of baby feeding tube to albino rats.

2.3 Animals

Male healthy adult Wistar rats (150-170 g, age 90 days) were obtained from M/s. Dr. Samsun Immuno Research Laboratory, Tiruppur, India. They were housed in plastic cages with filter tops under controlled conditions of a 12h light/12h dark cycle, 50% humidity and 28°C. The animals were fed standard rats chow (Lipton Lever Ltd., India) and water ad libitum. The animal experiments were approved by animal ethical committee of institute (722/02/a/CPCSEA dt. 04.12.2006).

2.4 Experimental design

Animals were divided into different groups with six animals in each group. Group I served as normal control and received standard diet throughout experimental period. Group II, III, and IV received atherogenic diet (79% standard diet + 21% Butter fat) throughout the treatment period. Group III received Geriforte (450 mg kg⁻¹ body weight). Group IV received Ayurslim (250 mg kg⁻¹ body weight). Treatment periods for all these groups were eight days.

At the end of treatment period to all these groups, the animals were used for various biochemical parameters. The animals were deprived of food overnight, anesthetized using light ether and sacrificed by cervical decapitation. Blood was collected and centrifuged by using table top centrifuge at 2000 rpm for 30 minutes so as to get serum.

Serum total cholesterol, triglyceride was estimated by the method of CHOD-PAP and high density lipoprotein by the method of GPO-PAP. Low density and very low density cholesterol were calculated by using Friedwald formula and Atherogenic index was calculated.

2.5 Statistical analysis

One way analysis of variance (ANOVA) followed by Dunnett’s t-test was carried out and *p<0.05 was considered significant.

3. RESULTS

Rats fed with atherogenic diet for thirty days display increase in their body weight as compared to normal. Treatment with Geriforte at the dose of 450 mg kg⁻¹ body weight showed significant (*p<0.05) decrease in body weight to 17.35% as compared to control group (34.10%) (Table 1).

There was marked increase in the level of serum TC and LDL-c and decrease in the level of good cholesterol carrier, HDL in the animal treated with atherogenic diet. Treatment with Geriforte and Ayurslim (450 mg kg⁻¹ body weight, 250 mg kg⁻¹ body weight, respectively) significantly decreases the level of TC, TG, LDL-c, VLDL-c and atherogenic index as compared to control. There was significant increase in the HDL-c as compared to control (Table 2).

4. DISCUSSION

Diseases associated with high TG levels (Diabetes mellitus, obesity, chronic renal disease, primary hyperlipoproteinemia) carry high risk of cardiovascular disorder (CVD) [9]. Hypertriglyceridemia in combination with abnormally low concentrations of HDL cholesterol (High Density Lipoprotein Cholesterol) is one of the most common and atherogenic profile of lipid metabolism of high prevalence seen in Indian population [10]. Hyperlipidemia and hypercholesterolemia are reportedly the major risk factors in lifestyle related diseases such as atherosclerosis and related cardiovascular complications including cerebral paralysis and myocardial infarction [11]. Prevention or treatment of such disorders can be achieved by targeting the causative hyperlipidemia and hypercholesterolemia through diet and/or drug administration [12,13]. Research on herbal medicines is gaining ground and the demand to use natural products in the treatment of various disorders is increasing worldwide. Investigations on herbal products might lead to the development of alternative drugs and strategies. Such alternative strategies are required for the effective management of dyslipidemic disorders as; cost

Table 2 Effect of Geriforte and Ayurslim on serum lipid level and atherogenic index after 8 days of hyperlipidemia induced by atherogenic diets in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dose (mg/kg)</th>
<th>Total cholesterol</th>
<th>Triglycerides</th>
<th>HDL-c</th>
<th>LDL-c</th>
<th>VLDL-c</th>
<th>Atherogenic index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>+36.18±5.92</td>
<td>18.12±1.98</td>
<td>32.14±6.12</td>
<td>8.78±2.35</td>
<td>2.541</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (Atherogenic diet)</td>
<td>+36.18±5.92</td>
<td>18.12±1.98</td>
<td>32.14±6.12</td>
<td>8.78±2.35</td>
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<td>Geriforte (450 mg kg⁻¹ body weight)</td>
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<td>8.78±2.35</td>
<td>2.541</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ayurslim (250 mg kg⁻¹ body weight)</td>
<td>+36.18±5.92</td>
<td>18.12±1.98</td>
<td>32.14±6.12</td>
<td>8.78±2.35</td>
<td>2.541</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values are mean ± SD of six rats from each group. *P<0.05 when compared with the control group.
and poor availability of modern therapies make the rural populations particularly in developing countries vulnerable to such ailments.

In the present study, tritonised animals have been used to test the antitriglyceridemic and anticholesterolemic efficacy of polyherbal drugs as, such a model has been used for the induction of acute hyperlipidemia [14] as well as for testing the potential of natural/chemical hypolipidemic drugs [15,16]. The data shows that the polyherbal drug exerts significant antihyperlipidemic effect marked by significant lower serum cholesterol and triglyceride levels in hyperlipidemic plus Geriforte rats compared to hyperlipidemic rats. The Geriforte seems to have potent antitriglyceridemic affect as it could protect against atherogenic diet induced hypertriglyceridemia by 20.75% at the end of 8 day. It is shown that atherogenic diet elevates serum triglyceride levels essentially by preventing its uptake and clearance by inhibiting catabolising enzymes like lipoprotein lipase (LPL) and lecithin cholesterol acetyl transferase (LCAT) [17]. Apparently the Geriforte is able to reduce the inhibition on LPL and LCAT activity making triglycerides available for uptake and metabolism by tissues. The antilipidemic drug Ayurslim seems more potent in preventing the elevation in triglyceride levels. This is clear from the recorded minimal elevation of triglyceride by 75.62% at the end of 8 day as against 84.40% elevation in the hyperlipidemic animals. Since the Geriforte could prevent the elevation in serum cholesterol level almost to same extent as that of Ayurslim (28.30% Geriforte v/s 35.70% Ayurslim at the end of 8 day). It is clear that Geriforte is relatively more anti-hypercholesterolemic than antitriglyceridemic. Atherogenic diet induced hypercholesterolemia has been related to its ability to alter the physico-chemical properties of lipoproteins and thereby prevent their uptake by liver for clearance [18]. Geriforte drug has been shown to facilitate catabolism of LDL through its hepatic receptors in atherogenic diet treated rats.

In the present study it is seen that the Geriforte is effective in minimizing atherogenic diet induced increase in HDL-c as well as decrease in non-HDL-c (LDL + VLDL) suggesting promotion of decreased catabolism of non-HDL-c by the hepatic tissue. Similar conclusion has also been drawn by Pande and Sonal Dubey [19] in their study on hypolipidemic activity of *Sphaeranthus indicus* on atherogenic diet induced hyperlipidemia. The hypolipidemic efficacy of the Geriforte is also substantiated by the calculated cardiovascular risk factor and Atherogenic Index and despite being this drug it seems to be quite competitive to the hypolipidemic drug Ayurslim. A generalized serum lipid lowering effect is also indicated by the resistance to hyperlipidemia.

5. CONCLUSIONS

Overall, the results indicate that the active principles possessing single or diverse range of biological activities hold promise in developing polyherbal drug as a preventive measure in treatment of hyperlipidemia. The results are encouraging enough for further studies aimed at understanding the mechanism of action and identify the bioactive compounds. From our study we can conclude that Geriforte showed significant antihyperlipidemic activity.

REFERENCES


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