The Hypocholesterolemic Effect of *Stachyphaga cayennensis* Tea: Implications for the Management of Obesity and Hypertension

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**Abstract:** The effects of *Stachyphaga cayennensis* tea on the weight and plasma total cholesterol concentration of normal rabbits were investigated. Daily oral administration (2 ml. kg⁻¹) of the tea led to significant decreases (p<0.05) in the weight and plasma total cholesterol concentrations of the rabbits. These results support the use of *S. cayennensis* tea in the management of hypertension and obesity.

**Key words:** Hypertension, hypocholesterolemia, obesity, plasma total cholesterol, *Stachyphaga cayennensis*

**INTRODUCTION**

*Stachyphaga cayennensis* (family Verbenaceae) is also known as bastard false vervain. According to Taylor (2005) and the Raintree Nutrition (2007) website, the phytochemical constituents of *S. cayennensis* include flavonoids, triterpenes, monoterpene, iridoids, phytosterols, aromatic acids, GABA, dopamine and alkanes. It is used traditionally as an analgesic, antiacid, antidiabetic, anti-inflammatory, antipyretic, antisemiotic, antiulcerous, digestion stimulating, diuretic, gastroprotective, hepatoprotective, sedative and tonic agent (Melita Rodriguez and Castro, 1996; Schapoval et al., 1998; Mesia-Vela et al., 2004; Taylor, 2005; Akinnu et al., 2005; Penido et al., 2006). It is also used in the treatment of hypertension (Taylor, 2005) and diabetes mellitus (Adjanahoun et al., 1991; Taylor, 2005; Igoli et al., 2005; Adejajo et al., 2007). In spite of this multitude of ethnomedical applications, much of the pharmacological effect of *S. cayennensis* remains to be scientifically investigated. Consequently upon this, the present study was designed to investigate the effect of *S. cayennensis* tea on the weight and plasma total cholesterol levels of normal rabbits.

**MATERIALS AND METHODS**

Three month old New Zealand white rabbits weighing between 0.7-1.8 kg were obtained from a breeder in Benin City, in March, 2007. The animals were housed in clean, disinfected hutches and acclimatized on guinea growers mash (product of Bendel Food and Flour Mills, Ltd., Ewu, Nigeria) for a week after which they were weighed and randomly assigned into two groups (four per group). The baseline plasma total cholesterol levels were determined prior to administration. The test group was daily given, by intra-gastric gavage, 2 ml. kg⁻¹ of the extract for 22 days, while the control group received appropriate volumes of water by the same route. The extract in the form of an aqueous infusion (tea) was prepared daily by placing a tea bag (product of Institute of Phytomedicine, Benson...
Idahosa University, Benin City, Nigeria), containing 1.8 g of dried, powdered plant (S. cayennensis), in 250 mL of boiled water for 8 h. Mash and water were provided ad libitum. The production of the tea bags was directed by Professor MacDonald Idu of Botany Department, University of Benin, Benin City, Nigeria. Fresh feed was provided daily, while stale remnants were discarded. The rabbits were weighed weekly to allow for adjustments in administration of the extract. Blood samples were collected on day 1, 8, 15 and 22, for plasma total cholesterol assay.

The plasma total cholesterol concentrations were assayed enzymatically using Randox cholesterol kits (Randox Laboratories Ltd., UK), at the Biochemistry department, Central Hospital Benin, Benin City, Nigeria.

All values are quoted as the mean±SEM. Data were analyzed using the student’s t-test.

RESULTS AND DISCUSSION

The administration of the S. cayennensis tea produced a significant reduction (p<0.05) in weight of the animals, over the treatment period (Table 1). The effect of S. cayennensis tea on plasma total cholesterol concentrations is shown in Table 2. When compared to both the control and baseline (day 0) values, the plasma total cholesterol concentrations of the treated group, was significantly lower (p<0.10 on day 1 and then p<0.05 on days 8, 15 and 22). The above result indicates that the induction of hypcholesterolemia was gradual.

Present results indicate that the Stachytypheta cayennensis tea produced a reduction in weight. This makes sense because S. cayennensis is a diuretic and according to Freis et al. (1988), diuresis leads to weight loss which is in actual sense an index of volume loss and correlates with reduction in blood pressure. Weight reduction is one of the means of managing disorders of lipid metabolism, hypertension, obesity and coronary risk incidence (Reisin et al., 1978; Becque et al., 1988; ADA, 2005).

Elevated plasma cholesterol level is a recognized and well-established risk factor for developing atherosclerosis and other cardiovascular diseases (Kwiterovich, 1995, 1998) and is often found in hypertension (Ames, 1991, 1998; Ferreira et al., 1997; Zicha et al., 1999). Therefore, a reduction in plasma total cholesterol level reduces the risk of cardiovascular diseases. In this study, the tea elicited a reduction in plasma total cholesterol level. Although the mechanism of this hypcholesterolemic effect is not elucidated in this study, possible mechanisms are herein suggested. S. cayennensis contains phytosterols which are known to produce hypcholesterolemic effects by inhibiting cholesterol absorption (Mattson et al., 1982; Tilvis and Miettinen, 1986; Howard and Kritchevsky, 1997; Ostlund

Table 1: Effect of S. cayennensis tea on the weight of normal rabbits
Weight gain (kg week⁻¹)

<table>
<thead>
<tr>
<th>Control</th>
<th>Test</th>
</tr>
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<tbody>
<tr>
<td>0.0375±0.0144</td>
<td>-0.033±0.0232</td>
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</tbody>
</table>

Weight gain/week is expressed as mean±SEM, *: p<0.05 compared to control, n = 4, per group

Table 2: Time course of the hypcholesterolemic effects of S. cayennensis tea on normal rabbits
Plasma cholesterol concentration (mg dL⁻¹)

<table>
<thead>
<tr>
<th>Time</th>
<th>Control</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>63.3±8.02</td>
<td>63.0±8.20</td>
</tr>
<tr>
<td>Day 1</td>
<td>63.1±6.88</td>
<td>56.7±5.07***</td>
</tr>
<tr>
<td>Day 8</td>
<td>70.25±7.12</td>
<td>50.5±7.24**</td>
</tr>
<tr>
<td>Day 15</td>
<td>72.6±4.72</td>
<td>48.0±6.01**</td>
</tr>
<tr>
<td>Day 22</td>
<td>78.5±8.38</td>
<td>43.7±5.27**</td>
</tr>
</tbody>
</table>

Cholesterol concentrations are expressed as mean±SEM. *: p<0.05 compared to control, n = 4, per group. **: p<0.01 compared to control, n = 4, per group. ***: p<0.05 compared to baseline, n = 4, **: p<0.10 compared to baseline, n = 4
and Lin, 2006; Martirosyan et al., 2007) and/or enhancing LDL clearance (Howard and Kritchevsky, 1997). It also contains the esters of triterpene alcohols which are known to act by inhibiting hepatic cholesterol esterase (Rukmini and Raghuram, 1991; Howard and Kritchevsky, 1997). In addition to these, monoterpenes and flavonoids: two families of compounds that have established hypocholesterolemic effect (Dwyer et al., 1994; Batcheldor, 1995; Howard and Kritchevsky, 1997; Middleton et al., 2000) have also been isolated from S. cayennensis. Thus, anyone or a combination of some or all of the above mentioned components could have been responsible for the hypocholesterolemic effect of the extract, observed in this study.

In conclusion, present results support the use of S. cayennensis tea in the management of obesity and hypercholesterolemic conditions and by extension, the management of hypertension and reduction of the risk of cardiovascular diseases.

REFERENCES


