The Effect of *Teucrium polium* (Calpoureh) on Liver function, Serum Lipids and Glucose in Diabetic Male Rats

Mohammad Reza Shahraki*1, Mohammad Reza Arab2, Ebrahim Mirimokaddam3 and Mony Jey Palan4

1Dept. of Physiology, 2Dept. of Histology, Zahedan University of Medical Sciences, Faculty of Medicine; 3Dept. of Hematology, 4Dept. of English Language, Zahedan University of Medical Sciences; Zahedan, Iran

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ABSTRACT

**Background:** *Teucrium polium* is an analgesic, antidiabetic and antilipemic herbal medicament. The aim of this survey was to evaluate the effect of aqueous extract of *T. polium* on liver enzymes linked to liver dysfunction, serum lipids and glucose, in diabetic male rats. **Methods:** A total of 20 Sprague-Dawly male rats became diabetic by intraperitoneal injection of streptozotocin (60 mg/kg). The animals were divided randomly into two groups. Experimental group was fed *Teucrium polium* (50 mg/kg) for a month but control group was received the same volume of distilled water. Liver enzymes, biochemical parameters (cholesterol, triglyceride, low density lipoprotein, alanine transaminase, aspartate transaminase) and glucose were measured by kinetic (Enzymatic) and colorimetric methods. Data obtained were analyzed and mean values were compared by paired student's *t*-test. The results were expressed as mean ± SD. Significant differences were set at *P*<0.05. **Results:** Our results showed that in test group, serum glucose values decreased significantly (*P*<0.05), but cholesterol, triglyceride, low density lipoprotein, alanine transaminase and aspartate transaminase increased significantly after use of *T. polium* (*P*<0.05). This parameters value did not show any changes in control group. **Conclusion:** Although the aqueous extract of *Teucrium polium* has strong hypoglycemic properties in experimental animals, but because of some hepatotoxic effects, it is not suitable to use it in human as an antidiabetic agent. *Iran. Biomed. J. 11 (1): 65-68, 2007*

**Keywords:** *Teucrium polium*, Liver function, Blood glucose

INTRODUCTION

Liver is the major organ of the body that has an important effect on carbohydrates and lipid metabolism [1]. In the presence of insulin, glucose is used but lipids and proteins are stored in the body [2]. In diabetes mellitus, insulin deficiency leads to failure of glucose consumption, consequently results in breakdown of lipids and proteins [3].

In traditional medicaments, *Teucrium polium* is used as analgesic, anti-spasmodic and hypolipidemic agent [4-6]. Visceral analgesic effects of *T. polium* extract compete considerably with those of indomethacin and hyoscine [4].

Use of *T. polium* in sacharomycetes culture media *in vitro* led to decrease in fatty acids and acts as anti-fungal, anti-bacterial and anti-inflammatory agent, and blocks the peroxidation of erythrocytes [7-9]. There is an agreement for hepatotoxicity of *T. polium* administration [10]. Administration of 150 mg/kg Tusceium polium extract was showed to act as an anti-ulcer agent [11]. Intravenous infusion and i.p. injection of plant extract after 4 and 24 hours led to decrease of blood sugar in rats [12]. Oral and i.p. administration of dried aerial parts and bloom extract of *T. polium* decreased appetite, water and food consumption and consequently body weight in rats [13]. The side effect of *T. polium* extracts were reported in diabetic patients who used it as an anti-diabetic agent [14, 15]. Oral...

*Corresponding Author;
administration of alcoholic \textit{T. polium} extract showed no changes in fasting and postprandial blood sugar in diabetic patient [16]. Zal \textit{et al.} [17] reported that the administration of \textit{T. polium} boiling extract had an anti-diabetic effect on diabetic rats [17]. With considering the controversial reports of the above studies, the prime aim of this study was to identify the the effect of \textit{T. polium} aqueous extract on blood glucose, Liver enzymes linked to liver dysfunction and serum lipid in streptozotocin diabetic male rats.

**MATERIALS AND METHODS**

A total of 20 Sprague-Dawly male rats weighting $220 \pm 14$ g were purchased from Pasteur Institute of Tehran (Iran). Animals were housed in cages under conditions of controlled temperature (22-28\(^\circ\)C) and a 12-h artificial light period for 10 days before and during of experiments) and had free access to water and standard pellet diet. The dried parts of \textit{T. polium} during of experiments were purchased from herbalists in Kerman and were authenticated by the Center for Research on Natural Resources and Livestock (Ministryof Agricultural Jihad, Isfahan, Iran) as \textit{T. polium}; L. Every day, 120 mg of cleaned aerial parts of \textit{T. polium} was suspended in 15 ml of water and put on a shaker for 24 hours. The suspension was cleared upon passing through several layers of chees. Animals became diabetic by i.p. injection of streptozotocin (60 mg/kg) and were divided randomly into two groups. Experimental group was gavaged \textit{T. polium} (50 mg/kg, \(d = 1.09\)) for 4 weeks but control group was received the same volume of distilled water. After a week that animals showed diabetic behavior such as polyuria and Polydipsia, at fasting state were showed diabetic behavior. Every day, 120 mg of cleaned aerial parts of \textit{T. polium} was suspended in 15 ml of water and put on a shaker for 24 hours. The suspension was cleared upon passing through several layers of chees. Animals became diabetic by i.p. injection of streptozotocin (60 mg/kg) and were divided randomly into two groups. Experimental group was gavaged \textit{T. polium} (50 mg/kg, \(d = 1.09\)) for 4 weeks but control group was received the same volume of distilled water. After a week that animals showed diabetic behavior such as polyuria and Polydipsia, at fasting state were showed diabetic behavior.

Sample Kolmogrov-Smirnov test, then by Levant's and compared by paired student's \(t\)-test. Significant differences were set at \(P<0.05\). All statistical analyses were performed using SPSS (v.11).

**RESULTS AND DISCUSSION**

Our results revealed that serum glucose value was significantly decreased but cho, TG, ALT and lipoproteins were significantly increased after \textit{T. polium} administration however these parameters did not show any changes in control group (Table 1 and 2, \(P\leq0.05\)). The comparison of mean weights in test group before (221.1 \(\pm\) 16.14g) and after use of \textit{T. polium} (219.6 \(\pm\) 14.29 g) did not show any significant changes but the mean weights in control group before (221.28 \(\pm\) 11.95 g) and after the study (191.85 \(\pm\) 18.15 g) of the test were significantly decreased (Table 3, \(P = 0.01\)). The comparison of water consumption in test (145.88 \(\pm\) 28.79 cc) and control groups (154.61 \(\pm\) 21cc) did not show any significant changes.

<table>
<thead>
<tr>
<th>Biochemical parameters</th>
<th>Before \textit{T. polium} administration</th>
<th>After \textit{T. polium} administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>64.00 (\pm) 14.90</td>
<td>(94.20 \pm 5.73)</td>
</tr>
<tr>
<td>Triglyceride (mg/dl)</td>
<td>85.10 (\pm) 17.18</td>
<td>(146.00 \pm 15.51)</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>33.10 (\pm) 10.70</td>
<td>(41.00 \pm 11.03)</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>13.91 (\pm) 7.80</td>
<td>(23.96 \pm 11.30)</td>
</tr>
<tr>
<td>AST (U/L)</td>
<td>86.80 (\pm) 25.70</td>
<td>(383.10 \pm 196.13)</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>118.10 (\pm) 18.57</td>
<td>(355.60 \pm 259.80)</td>
</tr>
<tr>
<td>ALP (U/L)</td>
<td>936.00 (\pm) 253.57</td>
<td>(970.40 \pm 275.60)</td>
</tr>
<tr>
<td>Glucose (mg/dl)</td>
<td>283.61 (\pm) 22.13</td>
<td>(96.22 \pm 11.90)</td>
</tr>
</tbody>
</table>

\(N=10\); values are mean ± SD; \(\ast P<0.05\).

Our results are in part in accordance with Rasaekh \textit{et al.} [12] which showed that \textit{T. polium} decreased the serum glucose level of diabetic rats. Although we did not show any antilipidemic effect for \textit{T. polium} aqueous extract, Rasaekh \textit{et al.} [12] reported antilipidemic effect of alcoholic \textit{T. polium} extract; this difference in our results may be due to the difference in method of \textit{T. polium} administration. We used oral method whereas they used i.p. method. Some of the parameters such as AST and ALT values increased after \textit{T. polium} administration in...
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Table 2. Comparison of AST, ALT, ALP, HDL, LDL, triglyceride, cholesterol and glucose before and after period of experiment in control group.

<table>
<thead>
<tr>
<th>Biochemical parameters</th>
<th>Before period of experiment</th>
<th>After period of experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>61.28 ± 12.86</td>
<td>104.00 ± 18.22</td>
</tr>
<tr>
<td>Triglyceride (mg/dl)</td>
<td>76.14 ± 15.51</td>
<td>163.85 ± 48.05</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>34.86 ± 8.45</td>
<td>38.00 ± 8.16</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>13.62 ± 9.21</td>
<td>33.00 ± 12.60</td>
</tr>
<tr>
<td>AST (U/L)</td>
<td>83.85 ± 20.43</td>
<td>165.71 ± 34.52</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>107.28 ± 20.68</td>
<td>195.14 ± 73.09</td>
</tr>
<tr>
<td>ALP (U/L)</td>
<td>1234.70 ± 313.19</td>
<td>1307.71 ± 317.51</td>
</tr>
<tr>
<td>Glucose (mg/dl)</td>
<td>270.40 ± 41.20</td>
<td>283.14 ± 46.71</td>
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</tbody>
</table>

Table 3. Comparison of weight between control and test group before and after experiment period.

<table>
<thead>
<tr>
<th>groups</th>
<th>Weight (g)</th>
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<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
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<td>experiment</td>
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<tr>
<td>Test group (n = 10)</td>
<td>221.10 ± 16.14</td>
<td>219.60± 14.29</td>
<td></td>
</tr>
<tr>
<td>Control group (n = 7)</td>
<td>221.85 ± 11.95*</td>
<td>191.85± 18.15</td>
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</tr>
</tbody>
</table>

N = 17; values are mean ± SD; *P<0.05.

ACKNOWLEDGMENTS

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REFERENCES