HYPOGLYCAEMIC ACTIVITY OF AQUEOUS EXTRACT OF LEAFS OF
Strobilanthes crispa L. IN MALE WISTAR RATS USING GLUCOSE TOLERANCE
TEST METHOD
Aktivitas hipoglikemia ekstrak air daun Strobilanthes crispa L. terhadap tikus jantan
galur wistar dengan metode toleransi glukosa

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ABSTRAK
Daun Strobilanthes crispa L. digunakan dalam pengobatan tradisional untuk mengatasi diabetes dan batu ginjal. Penelitian ini bertujuan untuk mengetahui efek hipoglikemik ekstrak air daun Strobilanthes crispa L. pada tikus betina galur Wistar dengan metode toleransi glukosa. Ekstrak dosis 150 dan 300 mg/kg bb masing-masing diberikan p.o pada tikus betina. Analisa peningkatan glukosa darah dilakukan setiap 60 menit selama 3 jam. Kesimpulan penelitian ini, ekstrak air daun Strobilanthes crispa L. dosis 150 mg/kg bb memiliki efek yang setara dengan klorpropamid dosis 9 mg/kg bb.

Kata kunci: Strobilanthes crispa L., hipoglikemik, glukosa darah, ekstrak air, klorpropamid

ABSTRACT
Extract of has been used traditionally to treat diabetes mellitus and gallstones. The objective of this study is to test hypoglycemic effect of aqueous extract of leaves of S. crisp i s i n rats using glucose tolerance test method. Aqueous extract of leaves of S. crispa L. at doses 150 mg/kg bw and 300 mg/kg bw were orally administered in male Wistar rat. Blood glucose rate was analysed every 60 minutes over 3 hours. As conclusion, aqueous extract of leaves of S. crispa at dose 150 mg/kg bw gave similar effect with chlorpropamid at dose 9 mg/kg bw.

Key words: Strobilanthes crispa L., hypoglycaemic, blood glucose, aqueous extract, chlorpropamid

INTRODUCTION
Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia. It is associated with abnormalities in carbohydrate, fat, and protein metabolism and results in chronic complications including microvascular, macrovascular, and neuropathic disorders (Dipiro et al., 2008). The incidence of diabetes mellitus is growing rapidly in Indonesia, and it happens not only in urban but also in the rural areas.

Traditionally, Indonesian society used herbal medicine to treat diabetes mellitus. Various herbs are used, such as Physalis and Strobilanthes. Strobilanthes crispa L. is a small tree around 1-2 m, it belongs to Acanthaceae, commonly known as picah beling, kecibeling, kejibeling, or ngokilo in Indonesia (DepKes RL, 1977). The leaf of S. crispa contains alkaloid, saponin, flavonoid and polyphenol (Fransworth, 1966). Infusion of the leaf of S. crispa is used to treat diabetes mel-
litus and gallstones (Hutapea, 1991). This study is done to get scientific support for the utilization of S. crispa leaf extracts as antidiabetic agent.

MATERIALS AND METHODS

Plant collection and authentication

Leaves of S. crispa were collected from West Java. It was authenticated by School of Life Science and Technology, ITB.

Preparation of extract

Leaves of S. crispa were dried and then were powered to get a coarse powder. 200 g of this material was soaked in 2 L boiling distilled water for 30 minutes, and it repeated three times. Then the aqueous solution were dried at 90°C (yield: 31.90 % w/w) and used for experimental work at doses of 150 and 300 mg/kg.

Experimental animals

Healthy, adult Wistar male rats (150-250g) were obtained from Life Science Center, ITB. The animals were housed for 1 week prior to the experiments to acclimatize to the laboratory conditions. They were fed with standard rat feed and water ad libitum.

Antidiabetic activity

The glucose tolerance test was employed for the evaluation of antidiabetic activity. The animals were fasted for 16 h prior to experiment allowing only water during the fasting period. In the beginning, blood was collected (T0). The aqueous extracts of S. crispa were suspended in 0.5% carboxymethyl cellulose (CMC) for oral administration and the drug treatment pattern was as follow:

1. Group I (control)
   Received normal saline (0.9%) orally at a dose of 10 ml/kg bw.
2. Group II (standard)
   Received chlospropamide orally at a dose of 9 mg/kg bw.
3. Group III (test 1)
   Received aqueous extract at a dose of 150 mg/kg bw.
4. Group IV (test 2)
   Received aqueous extract at a dose of 300 mg/kg bw.

Each rat was then orally administered with 3 g/kg bw of glucose after 30 minutes after oral administration. Blood was collected every hour over 3 hours after the dose was administered. During this period no food was made available to the animals. Serum was separated by centrifugation (3000 rpm, 15 minutes) and serum glucose was estimated by GOD/POD method.

Statistical analysis

SPSS (version 17.0) statistical program was used to carry out one-way analysis of variance (ANOVA) on the data, followed by T-test. All the values expressed are Mean ± S.E.M. P< 0.05 (Compared to control) was considered significant.

RESULTS AND DISCUSSION

As shown in Table 1, proximate analysis of S. crispa simplisia contained the following: ash (17.21%) and moisture (9.29%), while the S. crispa aqueous leaf extracts contained: ash (19.63%) and moisture (6.16%).
Several plants that usually used to treat diabetes have been shown to contain phytochemicals. Phytochemical screening of *S. crispa*, both simplisia and aqueous extracts of leafs, showed the presence of alkaloids, flavonoid, saponins, polyphenol and quinone (Table 2).

Table 1. Proximate analysis of *S. crispa*

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Percentage composition (%)</th>
<th>Simplisia</th>
<th>Aqueous extracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ash</td>
<td>17.21 ± 0.19</td>
<td>19.63 ± 0.45</td>
<td></td>
</tr>
<tr>
<td>2 Dry</td>
<td>9.29 ± 0.47</td>
<td>6.16 ± 0.36</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Phytochemical analysis of *S. crispa*

<table>
<thead>
<tr>
<th>Chemical content</th>
<th>Simplisia</th>
<th>Aqueous extracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Alkaloids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2 Flavonoid</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3 Saponins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4 Tannins</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5 Polyphenol</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Monoterpenoid</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sesquiterpenoid</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steroidal and Tri-terpenoidal</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Quinone</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Presence of individual phytochemicals is represented by +, while absence is indicated by -.

Table 3. Blood glucose level on 3 hours after oral administration of aqueous extract of *S. crispa* leaf (mean ± SEM). *P<0.05 as compared with control (T-test)

<table>
<thead>
<tr>
<th>Dose</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kontrol</td>
<td>90.78 ± 9.73</td>
<td>210.44 ± 10.50</td>
<td>192.60 ± 7.85</td>
<td>170.96 ± 16.16</td>
</tr>
<tr>
<td>Chlorpropamide</td>
<td>90.00 ± 8.20</td>
<td>128.34* ± 6.82</td>
<td>110.41* ± 3.14</td>
<td>95.42* ± 5.33</td>
</tr>
<tr>
<td>150 mg/kg bw</td>
<td>82.98 ± 11.01</td>
<td>128.47* ± 21.40</td>
<td>113.59* ± 15.57</td>
<td>105.49* ± 9.51</td>
</tr>
<tr>
<td>300 mg/kg bw</td>
<td>83.62 ± 10.23</td>
<td>149.32* ± 15.38</td>
<td>123.77* ± 12.02</td>
<td>118.60* ± 13.89</td>
</tr>
</tbody>
</table>

Aqueous extracts of leaf of *S. crispa* at a dose og 150 mg/kg bw and 300 mg/kg bw showed significantly hypoglicemic effect compared to control after 2 and 3 hours (p<0.05). The leaf extract at a dose 150 mg/kg bw gave similar effect with chlorpropamid of 9 mg/kg bw after 1, 2 and 3 hours (p>0.05).

**REFERENCES**

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