Hypoglycemic Activity of Andrographis paniculata Nees. and Lagerstroemia speciosa L. Herbal Tea Combination.

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Abstract
The combination of Andrographis paniculata Nees and Lagerstroemia speciosa L. herbal tea was evaluated in alloxan-induced diabetic mice, due to andrographolide and corosolic acid that have known for its hypoglycemic effect. This study aimed to find out that combination of Andrographis paniculata Nees and Lagerstroemia speciosa L. herbal tea will have better hypoglycemic effect than single preparation.

Alloxan monohydrate (150mg/kg BW) intraperitoneally to make hyperglycemia condition in mice. Glibenclamide (0.013 mg/20g BW) used as control positive and the suspension of CMC-Na 0.5% as control negative. Oral administration of herbal tea (0.4ml/20g BW) was given to 5 groups (Andrographis paniculata Nees, Lagerstroemia speciosa L. and both combination with ratio 2:1, 1:1 and 1:2) for 7 days. The result is all group of herbal tea have hypoglycemic effect. Andrographis paniculata Nees. showed the biggest reduction in BGL (75.20±133.00 mg/dL) than the other herbal tea groups. Data obtained was subjected to annova one-way analysis of variance followed by Tukey test to determine the statistical significance of the change in BGL. Only control positive that has significant difference with Negative control groups (P < 0.05).

Key words: Andrographis paniculata Nees, Lagerstroemia paniculata L., herbal tea, hypoglycemic effect

INTRODUCTION
Diabetes mellitus is a disease caused by increased blood glucose level as result of impaired insulin secretion (Katzung, 2010).

According to WHO (2011) 346 millionspeople all around the world tested positive of diabetes mellitus. Meanwhile in Indonesia, 5.7% of mortality in 2007 caused by diabetes mellitus (Depkes RI, 2007).

Oral Antidiabetic Drug (OAD) and insulin are common therapies used for patient with diabetes mellitus. However, the use of modern medicines still effect. Mechanism of andrographolide to decreased blood glucose level in diabetic mice is like insulin.

Andrographolide is the main component of Andrographis paniculata Nees. that have hypoglycemic

The hot water extract of ‘bungur’ (Lagerstroemia speciosa L.) also have known for its hypoglycemic effect to decreased blood glucose level of alloxan induced mice. Corosolic acid is the main component of Lagerstroemia speciosa L. that responsible to decreased blood glucose level in diabetic mice (Saha et al., 2009).

The aim of this research is to test the hypoglycemic activity of Andrographis paniculata Nees. And Lagerstroemia speciosa L. in preparation of herbal tea combination.

MATERIAL AND METHODS
Animals. Adult male mice of body weights ranging from 20–40 g were obtained from Animal Laboratory, Department of Pharmacognosy and Phytochemistry, Airlangga University.

Chemicals. Alloxan monohydrate (Sigma®), Glibenclamide (PT Kimia Farma®), CMC-Sodium, found dissatisfaction with the effectiveness of therapy in patients with diabetes mellitus.

Herbal tea used as the extraction method. The main reason is that preparation of herbal tea as drug has been common in society around the world. Therefore, preparation of herbal tea is simple, easy and cheapfull (Handa et al., 2008).

The hot water extract of ‘sambiloto’ (Andrographis paniculata Nees.) have known for its hypoglycemic effect to decreased blood glucose level of alloxan induced mice (Hossain et al., 2007).

Glucometer (EasyTouch® GCU Meter) and Blood Gluco-strip (EasyTouch® GCU Meter).

The herb of Andrographis paniculata Nees. were collected from Purwodadi Botanical Garden. The leaves Lagerstroemia speciosa L. were collected from local area of Surabaya, Indonesia. Both plants were identified in Purwodadi Botanical Garden, Pasuruan, Indonesia.

Herbal tea preparation. The herb of Andrographis paniculata Nees. and the leaves of Lagerstroemia speciosa L. were dried for several days. Therefore, both plants were minced into little pieces. After that, both plants were mixed in three ratios (2:1; 1:1 and 1:2) into tea bag. Each tea bag has a weight of 10g.

Experimental induction of diabetes
The mice were injected with alloxan monohydrate (Sigma®) dissolved in sterile normal saline at a dose of 150 mg/kg body weight intraperitoneally. Before the injection, all mice were fasted for 18 hours. After three days, mice with blood glucose of 200–600 mg/dL were used for the experiment.

Experimental design. The diabetic mice were divided into eight group. Group 1. Normal mice (non-diabetic), Group 2. Negative control (CMC-Na 0.5%),. Group 3. Positive control (glibenclamide 0.013mg/20g
Table 1. Blood glucose level of 7-days oral administration Andrographis paniculata Nees. and Lagerstroemia speciosa L. in preparation of herbal tea combination in alloxan induced mice

<table>
<thead>
<tr>
<th>Group</th>
<th>Blood Glucose Level (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0th Day</td>
</tr>
<tr>
<td>Normal mice</td>
<td>110.40±11.78</td>
</tr>
<tr>
<td>Negative control (CMC-Na 0.5%)</td>
<td>435.40±87.60</td>
</tr>
<tr>
<td>Positive control (glibenclamide 0.013mg/20g body wt.)</td>
<td>402.60±67.66</td>
</tr>
<tr>
<td>A. paniculata 0.4ml/20g body wt.</td>
<td>418.80±63.20</td>
</tr>
<tr>
<td>L. speciosa 0.4ml/20g body wt.</td>
<td>493.60±82.78</td>
</tr>
<tr>
<td>Combination of A. paniculata and L. speciosa (ratio 2:1) 0.4ml/20g body wt.</td>
<td>404.60±74.24</td>
</tr>
<tr>
<td>Combination of A. paniculata and L. speciosa (ratio 1:1) 0.4ml/20g body wt.</td>
<td>513.60±70.58</td>
</tr>
<tr>
<td>Combination of A. paniculata and L. speciosa (ratio 1:2) 0.4ml/20g body wt.</td>
<td>444.60±54.77</td>
</tr>
</tbody>
</table>

The values are expressed as mean ± SEM. n = 6 animals in each group. Statistical significant test for comparison was done by ANOVA, followed by Tukey’s test. The blood glucose values of each groups are compared with negative control animal. *P<0.05

Table 2. Glucose Blood Reduction. The values are expressed as mean ± SEM

<table>
<thead>
<tr>
<th>Herbal Tea (mg/dL)</th>
<th>Combination (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrographis paniculata L. speciosa</td>
<td>2:1</td>
</tr>
<tr>
<td>7 days</td>
<td>7 days</td>
</tr>
<tr>
<td>Mean</td>
<td>75.20</td>
</tr>
<tr>
<td>SEM</td>
<td>59.48</td>
</tr>
</tbody>
</table>

According to statistical analysis using SPSS 17.0 there are no significant of groups reduction (p<0.05) in the blood glucose level of diabetic mice after 7 days of treatment when compared with control positive mice.

From Glucose Blood Reduction’s above, it can be seen that herbal tea of A. paniculata (single compound) gives largest average blood glucose reduction at 75.20 mg/dL (0.4ml/20g body wt.) within 7 days. Therefore, herbal tea combination of A. paniculata and L. speciosa 2:1 have the largest average blood glucose reduction at 65.00 mg/dL (0.4ml/20g body wt.) within 7 days.

Andrographolide is the main compound from Andrographis paniculata Nees. that have hypoglycemic effect with mechanism decreased blood glucose level in diabetic mice, insulin like. Corosolic
acid is the main component of *Lagerstroemia speciosa* L. that responsible to decreased blood glucose level in diabetic mice. Corosolic acid also have same mechanism as andrographolide to decreased blood glucose level in diabetic mice.

Therefore, andrographolide give bigger contribution to decreased blood glucose level in diabetic mice rather than corosolic acid. Both combination will decreased hypoglycemic effect. Its becaused andrographolide and corosolic acid have same mechanism to decreased blood glucose level in diabetic mice and if both plants used together as in herbal tea preparation its will make competition effect.

**Conclusion**

Descriptively herbal tea combinations of *Andrographis paniculata* Nees. And *Lagerstroemia speciosa* L. in many ratio have hypoglycemic effect in alloxan induced mice although the activity of herbal tea combinations in many ratio have no significantly difference (p<0.05)

**REFERENCES**


