Effects of *Allium sativum* and *Vernonia amygdalina* on Thrombosis in Mice

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Extracts of *Allium sativum* and *Vernonia amygdalina* have been evaluated for antithrombotic activity in mice. Both plant extracts offered protection against thrombosis produced by an intravenous injection of a mixture of ADP and adrenaline, with *Allium sativum* showing a stronger activity. © 1997 John Wiley & Sons, Ltd.


**Keywords:** Allium sativum; Vernonia amygdalina; antithrombotic activity

**INTRODUCTION**

Cardiovascular disease is one of the major causes of death in the world. Over the years, much effort has been directed at measures for preventing and curing the disease.

It is now generally accepted that blood platelets are involved in the genesis of many cardiovascular diseases such as stroke, myocardial infarction, diabetic vascular disorders, atherosclerosis etc. (Venton et al., 1991).

*Allium sativum* (garlic), belonging to the family Liliaceae has been reported to possess antitheromatous properties, to enhance platelet aggregation and to reduce blood pressure (Venton et al., 1991). It is also reputed to offer protection against stroke and coronary thrombosis (Iwu, 1993).

*Vernonia amygdalina* of the family Compositae has also been reported to cause a marked reduction in blood pressure (Venton et al., 1991). Vernolepin, a sesquiterpene lactone from this plant has been shown to possess antiplatelet activity (Iwu, 1993).

This study aims at establishing the possible anti-thrombotic effects of these plants extracts, using a method suited for screening potential antithrombotic agents which act primarily against platelet thromboembolism.

**MATERIALS AND METHODS**

**Plant material and extraction.** Dried bulbs of *Allium sativum* were reduced to a powdery form and the powder extracted in petroleum ether, concentrated and thereafter dissolved in 2.5% Tween 80.

Leaves of *Vernonia amygdalina* were collected and oven-dried, after which they were blended, and the blended material extracted in methanol using a soxhlet extractor. The extract was then concentrated to a solid, which was dissolved in normal saline.

**Animals.** Male Swiss albino mice, bred and housed in the Pre-Clinical Animal House, College of Medicine, University of Ibadan were used. The animal house was well ventilated and the animals were fed on standard mouse cubes, and water was available *ad libitum*.

**Anti-thrombotic activity.** The method described by DiMinno and Silver (1983) was used. Saline solutions (0.1 mL) of platelet aggregating mixture comprising adrenaline (Sigma, St. Louis, MO, USA) and ADP (Sigma, St. Louis, MO, USA) at a dose of 1.8 mg/mouse and 260 μM respectively were injected into the tail vein of the mice at a rate of 20 μL/s, using a butterfly needle. Ability of an anti-thrombotic agent to protect mice from the lethal or paralytic effect was assayed by administering *A. sativum* (100 and 200 mg/kg), *V. amygdalina* (100 and 200 mg/kg), normal saline of equal volume (control), or aspirin (20 mg/kg), which served as the reference drug 1 h before the injection of the mixture of thrombogenic agents. Animals that did not die within 5 min or remained paralysed for less than 15 min were considered protected.

**Statistical analysis.** Student’s *t*-test statistics were employed to determine significant differences between the treated groups and the control.

**RESULTS AND DISCUSSION**

As shown in Table 1, *A. sativum* at 100 mg/kg produced a 60% ± 1.2% protection against thrombosis, whereas at 200 mg/kg, the protection was 85% ± 1.0%.

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose (mg/kg) i.p.</th>
<th>Percent inhibition ± SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Normal saline</td>
<td>5.0 ± 0.6</td>
</tr>
<tr>
<td><em>A. sativum</em></td>
<td>100</td>
<td>60 ± 1.2*</td>
</tr>
<tr>
<td><em>V. amygdalina</em></td>
<td>200</td>
<td>85 ± 1.0*</td>
</tr>
<tr>
<td><em>V. amygdalina</em></td>
<td>100</td>
<td>40 ± 2.3*</td>
</tr>
<tr>
<td>Aspirin</td>
<td>200</td>
<td>55 ± 1.5*</td>
</tr>
</tbody>
</table>

*p<0.005; Students t-test compared with control, n=5.

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200 mg/kg *V. amygdalina* offered protection of 40% ± 2.3% and 55% ± 1.5% respectively. Aspirin which served as the standard drug offered a protection of 95% ± 1.0%. With animals pre-treated with normal saline a protection of 5.0% ± 0.6% was observed.

The study established an antithrombotic activity of both *Allium sativum* and *Vernonia amygdalina* in an animal model. Their antithrombotic activity could be due to their ability to inhibit platelet aggregation, a process that has been implicated in various cardiovascular disorders in which thrombosis is the underlying mechanism. Aspirin, the standard drug used in this study (which is a non-steroidal anti-inflammatory drug) is an established antithrombotic agent.

Some pyrazine CH- and NH- acids have also been reported to be antiaggregatory/antithrombotic agents, and are also known to be potent inhibitors of thromboxane synthetase (Petrusewicz *et al.*, 1993). However, this study did not establish the mechanism by which these two medicinal plants exhibit antithrombotic activity. Mechanisms such as inhibition of thromboxane A₂ formation and the level of cyclic AMP in platelets could be studied.

REFERENCES


