Analgesic Activity of Salvia wiedemannii Boiss. Used in Turkish Folk Medicine

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Abstract: The aerial part of Salvia wiedemannii Boiss. (Lamiaceae) has been used for treatment of peptic ulcers and relieving pain in Turkish folk medicine. To evaluate the analgesic effect of S. wiedemannii, tail flick and acetic acid-induced writhing tests were used in mice. The chloroform extract (500 mg/kg, i.p.) obtained from S. wiedemannii showed significant analgesic activity on tail flick assay, while water, ethanol and butanol extracts of the plant had no activity on the same test. Chloroform extract (500 mg/kg, i.p.) also inhibited number of writhings induced by acetic acid. Chloroform extract provided analgesic effects similar to morphine. Its effect was quick and durable. This in vivo study demonstrates that S. wiedemannii has strong analgesic effect as the public believed.

Key words: Salvia wiedemannii; analgesic activity; folk medicine.

1. Plant Source

The aerial parts of S. wiedemannii were collected in the vicinity of Yunak, Polatlı in Ankara, Türkiye, in May 2003. The identity of the plant was confirmed by Pharmacognosy Department, Gazi University Faculty of Pharmacy, and Ankara, Türkiye. These specimens were stored in the same institution (GUEF 2379).

2. Previous Studies

Salvia species belongs to the Lamiaceae are widely distributed in Turkey, 50% of the 89 Salvia species is endemic [1]. Various parts of some Salvia species have been reported to have traditional values. Many Salvia species have been used in various medical issues as follow: S. verticillata in catarrh and cold [2]. S. grandiflora in strenghthen teeth. S. cryptantha in stomach disorders and sterilizing wounds. S. triloba in gastrointestinal tract (GIT) symptoms such as stomachache, flatulence, and constipation as well as cold and cough. [3]. S. tomentosa in abdominal and rheumatic pains [3,4]. S. aethiopis in wound healing [4]. S. russellii, S. dichroantha and S. verticulata in abdominal pain and stomachache [5]. S. chrysopylla is used against rheumatism [6]. S. sclarea in treatment of wards and sunstroke [6,7]. S. nemorosa in hemorrhage and wounds [8].

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Salvia species have been used for similar symptoms or disorders by public of other countries [9-13]. The common indications include GIT symptoms/disorders (colic, diarrhea, indigestion, and abdominal pain), respiratory tract symptoms/disorders (colds, sore throat, and cough), infections (tuberculosis, bacterial infections, influenza, and parasitic infections), pain (headache and arthralgia), and miscellaneous disorders (diabetes mellitus, liver diseases, barrenness, urticaria, and hemorrhage).

Studies have demonstrated that Salvia species have important biological activities including antimicrobial (e.g., against Helicobacter pylori) [14,15], antioxidant [14,16-18], antiinflammatory [17,19,20], analgesic and antipyretic [21], and antiangiogenic [22]. Although a few chemical studies have been done on S. wiedemannii [23-25] there is no activity studies on its extracts [25]. This study reports in vivo analgesic activity of the prepared extracts from S. wiedemannii.

3. Present Study

Air-dried and powdered plant was macerated in 95% ethanol for 6 h in water bath adjusted to 40°C. Then the macerate was filtrated. The entire procedure was repeated three times. Combined extracts were evaporated to dryness in vacuo using a rotary evaporator (EtOH extract). EtOH extract was re-dissolved in 90% MeOH/H$_2$O (1000 mL) and extracted with portions of CHCl$_3$ (6x750 mL). A precipitate was obtained through the addition of methanol to the combined CHCl$_3$ extract that was removed through filtration. The filtrate was then evaporated in a rotary evaporator (CHCl$_3$ extract). The aqueous extract was then extracted with n-BuOH saturated with distilled H$_2$O and evaporated to dryness (BuOH extract). The remaining aqueous part was lyophilized (remaining H$_2$O extract).

Swiss albino mice (20–25 g) of either sex was purchased from the Animal Breeding Laboratories of Gulhane Military Academy of Medicine (Ankara, Türkiye). The animals were left at least for 7 days to acclimatize to animal room conditions (24 °C) before experiments. They were maintained on standard pellet diet and water ad libitum. The food was withdrawn 24 h before the experiment, but allowed free access of water. To avoid coprophagy the mice were fasted in wire-bottomed cages. Animals, each group constituting of 6 mice, were used. Throughout the experiments, animals were processed according to the suggested international ethical guidelines for the care of laboratory animals. Institutional Animal Ethic Committee approval was obtained.

Acetic acid-induced writhing test: This test was accomplished according to the modified method of Koster et al. [26]. The writhes were induced by intraperitoneal administration of 0.8 % (v/v) acetic acid solution (10 mL/kg). Twenty minutes prior to the administration of acetic acid, the animals were treated intraperitonally with the extracts, vehicle (0.5% carboxymethyl cellulose) and references (morphine and aspirin). The number of writhings as an indication of pain was counted and recorded during 20 min period.

Tail flick test (D’Amour & Smith Test) [27]: Mice were held in position with the tail extending out and light heat was applied to tails of mice. A cut-off time of 10 sec. was used to avoid tissue damage. From application of heat to move the tail recorded. The mice had been administered different extracts of S. wiedemannii, a vehicle, or morphine via intraperitonal before light heat applied. The test repeated at the time periods of 20, 40 and 60 minutes.

All values were expressed as means ± S.E.M. The statistical analysis was performed by using one-way analysis of variance of (ANOVA) followed by the test of Dunnett’s Multiple Comparison Test. P < 0.05 was considered significant from the control.

Considering its common dosages used among people, we prepared the extracts. In vivo test results of its analgesic activity were given in Tables 1 and 2. As shown in Table 1, i.p. administration of the chloroform extract of S. wiedemannii at a dose of 500 mg/kg inhibited tail flick response at the 20th min. in mice. This response was rapid and durable similar to that observed with morphine. The analgesic activity, although decreased, was detected 60 minutes after.
When its chloroform, ethanol, butanol, and water extracts were used in writhing test, chloroform extract was found to have the strongest analgesic activity (Table 2). Once again, its efficacy was very close to morphine. The other extracts showed analgesic activities similar to that observed with aspirin.

The results of these two in vivo tests indicate that chloroform extract of S. wiedemannii has one or more constituents with strong analgesic effect. Since the tail-flick test is considered a specific model for compounds producing central antinociceptive activity [27], these results indicates that chloroform extract also exhibits central analgesic effects in mice.

In conclusion, the present study has clearly demonstrated that S. wiedemannii possesses a potent analgesic activity as suggested in Turkish folk medicine. This is the first report demonstrating the analgesic activity of S. wiedemannii in vivo; however, further studies will be necessary to isolate the active compounds which are responsible for the analgesic effect and to understand exact mechanisms of this activity.

Table 1. Effect of the extracts on tail flick test in mice

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose mg/kg, i.p.</th>
<th>0 min (basal)</th>
<th>20 min</th>
<th>40 min</th>
<th>60 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle (CMC)</td>
<td></td>
<td>2.2 ± 0.1</td>
<td>2.2 ± 0.1</td>
<td>2.2 ± 0.1</td>
<td>2.2 ± 0.1</td>
</tr>
<tr>
<td>Morphine</td>
<td>10</td>
<td>2.1 ± 0.1</td>
<td>5.5 ± 0.7*</td>
<td>4.5 ± 0.6*</td>
<td>3.8 ± 0.5*</td>
</tr>
<tr>
<td>EtOH extract</td>
<td>500</td>
<td>2.3 ± 0.1</td>
<td>2.2 ± 0.1</td>
<td>2.1 ± 0.1</td>
<td>2.3 ± 0.1</td>
</tr>
<tr>
<td>BuOH extract</td>
<td>500</td>
<td>2.3 ± 0.4</td>
<td>2.6 ± 0.1</td>
<td>2.9 ± 0.3</td>
<td>2.9 ± 0.3</td>
</tr>
<tr>
<td>H₂O extract</td>
<td>500</td>
<td>2.3 ± 0.2</td>
<td>2.3 ± 0.2</td>
<td>2.6 ± 0.3</td>
<td>2.7 ± 0.2</td>
</tr>
<tr>
<td>CHCl₃ extract</td>
<td>500</td>
<td>2.4 ± 0.1</td>
<td>5.2 ± 0.6*</td>
<td>4.1 ± 0.5*</td>
<td>3.4 ± 0.3*</td>
</tr>
</tbody>
</table>

n = 6 animals; CMC: Carboxymethyl cellulose; *p < 0.05, relative to control group value

Table 2. Effect of the extracts on acetic acid-induced writhing test in mice

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose mg/kg, i.p.</th>
<th>Writhe (mean ± S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle (CMC)</td>
<td></td>
<td>28.87 ± 2.27</td>
</tr>
<tr>
<td>Morphine</td>
<td>10</td>
<td>0.26 ± 0.48*</td>
</tr>
<tr>
<td>Aspirin</td>
<td>100</td>
<td>18.44 ± 2.79*</td>
</tr>
<tr>
<td>EtOH extract</td>
<td>500</td>
<td>20.05±4.27</td>
</tr>
<tr>
<td>BuOH extract</td>
<td>500</td>
<td>23.04±5.57</td>
</tr>
<tr>
<td>H₂O extract</td>
<td>500</td>
<td>22.84±3.41</td>
</tr>
<tr>
<td>CHCl₃ extract</td>
<td>500</td>
<td>0.33 ± 0.2*</td>
</tr>
</tbody>
</table>

n = 6 animals; CMC: Carboxymethyl cellulose; p < 0.01 relative to control group value

Acknowledgments

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References


