ANTIPYRETIC AND ANALGESIC EFFECT OF LEAVES OF SOLANUM MELONGENA LINN. IN RODENTS

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ABSTRACT

Objective: To investigate the antipyretic and analgesic activity of dry residue of leaf juice of Solanum melongena.

Methods: The preliminary phytochemical screening of the dry residue was carried out by chemical tests, spectrophotometric and thin layer chromatographic methods. Acute toxicity study was performed in mice after administration of the dry residue orally in graded doses (0.5-4 g/kg body weight). Antipyretic activity of dry residue of S. melongena (100, 250 and 500 mg/kg doses) was carried out on yeast induced pyrexia in rats. Analgesic activity of dry residue was evaluated in mice using the acetic acid induced writhing test at 100, 250 and 500 mg/kg doses.

Results: The preliminary phytochemical screening of the dry residue showed the presence of flavonoids, alkaloids, tannins and steroids. In acute toxicity study, no mortality was observed at a dose as high as 4 g/kg. The dry residue of fresh juice produced significant antipyretic effect in a dose dependent manner and an appreciable antipyretic effect was noticed at 500 mg/kg dose. A dose dependent analgesic activity was observed with S. melongena and significant effect was observed at 500 mg/kg dose.

Conclusion: The present study demonstrates the potential antipyretic and analgesic effect of S. melongena further supporting the claims by traditional medicine practitioners.

KEY WORDS
Antinociceptive  brinjal  pyrexia  rectal temperature

INTRODUCTION

Solanum melongena Linn. (Brinjal; Solanaceae), a culinary vegetable, has been in use in the Indian system of medicine. Various parts of the plant are useful in the treatment of inflammatory conditions, cardiac debility, neuralgia, ulcers of nose, cholera, bronchitis and asthma. Its antioxidant, analgesic and hypolipidemic activities have been reported. Also, the rural people of Bellary district (Karnataka, India) use the fresh juice of Brinjal leaves or its dry residue against fever. The present study was initiated to evaluate the antipyretic and analgesic activity of dry residue of leaf juice of Solanum melongena.

MATERIALS AND METHODS

Plant material: The leaves were collected in March from the rural areas of Bellary and identified in the Department of Botany, Veerasaiva College, Bellary.

Animals: Swiss albino mice (6-8 weeks) of either sex weighing 25-30 g and male Wistar rats weighing 150-200 g were used. They were housed in light controlled room (12:12h) and at constant temperature (22±2°C) conditions. Animals were fed with standard laboratory diet (Lipton Feed, Bombay, India) and water.

Preparation of dry residue of leaf juice: The juice of fresh leaves (yield: 48% w/w) was obtained by...
Table 1. Effect of dry residue of juice of *S. melongena* leaves on yeast induced pyrexia in rats.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg, p.o.)</th>
<th>Rectal temperature (°C)</th>
<th>Rectal temperature after administration of drug (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Normal (A)</td>
<td>18 h after yeast administration (B)</td>
</tr>
<tr>
<td>Control</td>
<td>0.5 ml</td>
<td>37.97 ± 0.17</td>
<td>38.70 ± 0.16</td>
</tr>
<tr>
<td>PRL</td>
<td>33</td>
<td>37.72 ± 0.14</td>
<td>38.40 ± 0.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>100</td>
<td>37.77 ± 0.20</td>
<td>38.32 ± 0.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>250</td>
<td>37.47 ± 0.17</td>
<td>38.45 ± 0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>500</td>
<td>37.27 ± 0.20</td>
<td>38.05 ± 0.19</td>
</tr>
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</tbody>
</table>

One-way ANOVA

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17.13</td>
<td>29.4</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>20.98</td>
<td>25.4</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>33.60</td>
<td>25.4</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

All values are expressed as mean±SE (n=6); Percentage reduction in rectal temperature is given within parentheses; PRL=Paracetamol; SM= Dry residue of juice of *S. melongena* fresh leaves; *P<0.05 significant compared to control; @P<0.05 significant compared to PRL.

B - Cᵢ  
% reduction = ----------------- X100; where n = 1, 2 or 3
B - A

Trituration, followed by pressing the leaves using a tincture press. The dry residue of the juice was obtained by evaporating the juice at room temperature (yield: 0.62% w/v). The preliminary phytochemical screening of the dry residue was carried out by chemical tests, spectrophotometric and thin layer chromatographic methods.

**Acute toxicity of dry residue:** Acute toxicity study was performed in mice divided into different groups of 6 each. After an overnight fast, the suspension of dry residue in 0.5% (w/v) sodium carboxy methylcellulose was administered orally in graded doses (0.5-4 g/kg body weight) to mice. They were observed continuously for the first 2 h for toxic symptoms and up to 24 h for mortality.

**Antipyretic activity:** Antipyretic activity was carried out according to the previously reported methods. Briefly, pyrexia was induced in rats by injecting 20% (w/v) aqueous suspension of Brewer’s yeast intramuscularly. After 18 h, the animals developed 0.5°C or more rise in the rectal temperature (about 60% of the total number of animals injected). They were distributed into different groups of 6 each and dry residue in the doses of 100, 250 and 500 mg/kg was administered orally. One group was administered with paracetamol (33 mg/kg) orally. Control group was given 0.5 ml normal saline. At different time intervals, rectal temperature was noted. Similarly, over night fasted normal animals were divided into different groups of 6 each and the experiment was carried out in the same manner as described above. Percentage reduction in rectal temperature was calculated by considering the total fall in temperature to normal level as 100%.

**Analgesic activity:** Analgesic activity was evaluated in mice using the writhing test. After an overnight fast, mice were distributed into 5 groups of 6 each. One hour after the oral administration of dry residue (100, 250 and 500 mg/kg) or paracetamol (45 mg/kg)
or normal saline (0.2 ml; control group), the mice were
given an intraperitoneal injection of 0.7% (v/v) acetic
acid solution (volume of injection was 0.1 ml/10 g body
weight). The number of writhes produced in these
animals was counted for 20 min.

**Statistical analysis:** Statistical significance was
analyzed using one-way ANOVA followed by
Bonferroni test and \( P < 0.05 \) was considered significant.

**RESULTS**

The preliminary phytochemical screening of the dry
residue showed the presence of flavonoids, alkaloids,
tannins and steroids. In acute toxicity study, the dry
residue of leaf juice was found to be safe and no
mortality was observed at a dose as high as 4 g/kg.

The results of effect of dry residue of juice of *S. melongena*
leaves on yeast induced pyrexia in rats are depicted in Table 1. *S. melongena* produced
significant \( (P < 0.05) \) antipyretic effect in a dose
dependent manner. An appreciable antipyretic effect
noticed at 0.5 g/kg was comparable to paracetamol.

Normal rats did not show any decrease in the body
temperature on oral administration of *S. melongena*.
The initial and final rectal temperatures (°C) for 3 groups
of *S. melongena* administered rats were 38.40±0.16
and 38.40±0.16 (100 mg/kg); 38.10±0.12 and 38.00±0.04
(250 mg/kg); 38.34±0.18 and 38.25±0.08
(500 mg/kg). The results of effect of *S. melongena* on
acetic acid induced writhing in mice are given in Table 2. The dry residue produced analgesic activity in a
dose dependent manner and a significant \( (P < 0.05) \) effect
was observed at a dose of 500 mg/kg.

**DISCUSSION**

In acute toxicity study, oral administration of *S.
melongena* did not produce any mortality in mice upto
a dose level of 4 g/kg. This may be due to the broad
non-toxic range of the plant as reported earlier, where
the *S. melongena* extract showed a high LD\(_{90}\) (more
than 1 gm/kg)\(^4\).

The dry residue of fresh juice produced significant
antipyretic effect in a dose dependent manner. The
phytochemical analysis of the dry residue showed the
presence of flavonoids, alkaloids, tannins and steroids.

The antipyretic activity observed can be attributed to
the presence of flavonoids. In many earlier studies,
flavonoids have been reported to exhibit antipyretic
effect\(^9,10\). The dry residue did not decrease the body
temperature in normal rats. In a previous study, the
increase in the body temperature intensified the lipid
peroxidation process, which indicates that pyrexia is
associated with increased oxidative stress. The
antioxidant supplementation decreased the lipid
peroxidation processes\(^11\). The flavonoids and an
anthocyanin (Nasunin) from *S. melongena* are
reported to have antioxidant activity\(^2,3\). Hence,
antioxidant activity of *S. melongena* may be one of
the possible mechanisms by which it reduces the
elevated body temperature.

In the present study, *S. melongena* produced
analgesic activity in a dose dependent manner and
significant effect was observed at 500 mg/kg. Generally, plants showing the antipyretic effect also
possess analgesic activity\(^12\). In an earlier report, the
alkaloidal extract of *S. melongena* was found to
produce significant analgesic effect\(^4\). A number of
flavonoids have been reported to produce analgesic
activity\(^8\). Also, there are few reports on the role of
tannins in analgesic activity\(^8\). Hence, the present
analgesic activity of *S. melongena* may be attributed
to the presence of alkaloids, flavonoids and tannins.

The present study demonstrates the potential
antipyretic effect of *S. melongena*, which supports the
claims by traditional medicine practitioners as an
antipyretic remedy.

**Table 2.** Effect of dry residue of juice of *S. melongena* leaves
on acetic acid induced writhes in mice.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg)</th>
<th>No. of writhings</th>
<th>Inhibition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Saline)</td>
<td>0.5 ml</td>
<td>81.66±2.23</td>
<td>-</td>
</tr>
<tr>
<td>PRL</td>
<td>45</td>
<td>28.33±2.18*</td>
<td>65.30</td>
</tr>
<tr>
<td>SM</td>
<td>100</td>
<td>76.66±3.56@</td>
<td>6.12</td>
</tr>
<tr>
<td>SM</td>
<td>250</td>
<td>66.00±4.21@</td>
<td>19.17</td>
</tr>
<tr>
<td>SM</td>
<td>500</td>
<td>54.66±4.71*@</td>
<td>33.06</td>
</tr>
</tbody>
</table>

One-way ANOVA \( F = 36.12 \)
\( df = 25,4 \)
\( P < 0.05 \)

All values are expressed as mean±SE (n=6); PRL=Paracetamol;
SM= Dry residue of juice of *S. melongena* fresh leaves;
*P<0.05 significant compared to control; @P<0.05 significant
compared to PRL.
ACKNOWLEDGEMENTS

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REFERENCES


