Antinociceptive activity evaluation of an Indonesian herbal product Pegal Linu in Swiss albino mice


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ABSTRACT

The antinociceptive activity of an Indonesian herbal product named Pegal Linu was evaluated in Swiss albino mice in acetic acid-induced abdominal pain model. The product, when administered to mice at doses of 25, 50, 100 and 200 mg per kg body weight, reduced the number of acetic acid-induced gastric constrictions by 30.0, 33.4, 56.6, and 60.0%, respectively. The results were statistically significant at all doses of the product except for the lowest dose of 25 mg per kg body weight. In comparison, a standard antinociceptive drug, aspirin, when administered at doses of 200 and 400 mg per kg body weight, reduced the number of gastric constrictions in mice, respectively, by 33.4 and 66.6%. The results suggest that the herbal product is comparable to aspirin in alleviation of pain and validates the use of this product for pain relief.

Key words: Antinociceptive, Indonesia, herbal, pain, Pegal Linu

Introduction

Pain forms a common affliction affecting human beings and can arise from varying causes. Cuts, bruises or sprains can cause temporary pain, while pain arising from stress, bone fracture or fever can persist for a few days to weeks. On the other hand, chronic pain is suffered by people with diseases like cancer or rheumatoid arthritis and cause severe depression in these patients on top of pain. Over the counter drugs for alleviation of pain like aspirin or paracetamol can give quick relief, but this relief is transient and does not last long for more than a few hours. Moreover, aspirin or paracetamol if taken for long time periods as happens with patients suffering from cancer or rheumatoid arthritis can cause gastric ulceration or hepatotoxicity, particularly following over-dosages. Other pain-killing drugs like morphine are addictive and can cause more severe problems like chronic depression and behavioral changes following withdrawal. As a result, a more efficacious drug is necessary, particularly for patients suffering from chronic pain.

We had been conducting ethnomedicinal surveys among the folk and tribal medicinal practitioners of Bangladesh for the last several years (Rahmatullah et al., 2009a-c; Rahmatullah et al., 2010a-g; Rahmatullah et al., 2011a,b; Rahmatullah et al., 2012a-d). From the information obtained from the traditional healers, further studies are conducted on selected floral species towards evaluation of their antinociceptive, antihyperglycemic, and cytotoxic potential (Anwar et al., 2010; Jahan et al., 2010; Khan et al., 2010; Mannan et al., 2010; Rahman et al., 2010; Rahmatullah et al., 2010h; Shoha et al., 2010; Ali et al., 2011; Barman et al., 2011; Hossan et al., 2011; Jahan et al., 2011; Rahman et al., 2011; Sutradhar et al., 2011; Ahmed et al., 2012; Arefin et al., 2012; Haque et al., 2012; Sathi et al., 2012). Towards an extension of this research, we have recently also started conducting studies on herbal products of other countries, particularly to evaluate their claimed antinociceptive and antihyperglycemic potential. Pegal Linu is an herbal product of Indonesia and is used to obtain relief from stiffness and pain in joints and muscles. It was the objective of the present study to evaluate the antinociceptive potential of Pegal Linu in acetic acid-induced gastric pain model in Swiss albino mice.

Materials and Methods

Pegal Linu was obtained from an herbal shop in Kuala Lumpur, Malaysia in 2012. The product was sold in 7g sealed packets, the contents of which were to be used for a single dosage. The front side of the packet (Fig 1)
bore the words Jamu Obat Alami, Pegal Linu (Ngeres Linu), LANGUOR, Halal-11A. The address of the manufacturer was given as Pabrik Jamu, AIR MANCUR, Wonogiri-SOLO-Indonesia. Indications as mentioned on the reverse of the packet described the contents as “Relieves stiffness and pain in joints and muscles, languor and tiredness after hard work/sport, revitalizing and invigorating body”. Directions as mentioned on the reverse of each packet mentioned “7g in each packet. Mix the contents of 1 packet with ½ a glass (100 ml) of boiling water. Take 3-4 packets every week, if necessary 1 packet twice daily”.

The reverse side of each packet gave the composition detailed below (also see Fig 2).

1. Piperis nigri fructus 4%
2. Coptici fructus 4%
3. Boesenbergiae Rhizoma 8%
4. Curcumae Rhizoma 20%
5. Curcumae domesticae 20%
6. Languatis Rhizoma 20%
7. Zingiberis aromaticae Rhizoma 4%
8. Corrigents 20%

Fig. 1: Front side of Pegal Linu packet.

Fig. 2: Reverse side of Pegal Linu packet.
Experimental dosages for mice experiments were determined on the basis of the packet information of 7g per human being, the average weight of a human being taken as 70 kg, i.e. 1g per 10 kg body weight, or 100 mg per kg body weight. The various doses for experimental purposes were fixed based on this afore-mentioned calculation as 25, 50, 100 and 200 mg per kg body weight of mice. Stock solution of Pegal Linu was made by suspending 1g of packet contents in 10 ml distilled water.

**Chemicals:**

Glacial acetic acid was obtained from Sigma Chemicals, USA; aspirin was obtained from Square Pharmaceuticals Ltd., Bangladesh.

**Animals:**

In the present study, Swiss albino mice (male), which weighed between 22-25g were used. The animals were obtained from International Centre for Diarrheal Disease Research, Bangladesh (ICDDR,B). All animals were kept under ambient temperature with 12h light followed by a 12h dark cycle. The animals were acclimatized for three days prior to actual experiments. The study was conducted following approval by the Institutional Animal Ethical Committee of University of Development Alternative, Dhaka, Bangladesh.

**Antinociceptive activity:**

Antinociceptive activity of Pegal Linu was examined using previously described procedures (Shanmugasundaram and Venkataraman, 2005). Briefly, mice were divided into seven groups of six mice each. Group 1 served as control and was administered vehicle only. Groups 2 and 3 were orally administered the standard antinociceptive drug aspirin at a dose of 200 and 400 mg per kg body weight, respectively. Groups 4-7 were administered Pegal Linu at doses of 25, 50, 100 and 200 mg per kg body weight, respectively. All mice were individually weighed and dose determined on the basis of individual weight. Following a period of 60 minutes after oral administration of standard drug or extract, all mice were intraperitoneally injected with 1% acetic acid at a dose of 10 ml per kg body weight. A period of 15 minutes was given to each animal to ensure bio-availability of acetic acid, following which period, the number of abdominal constrictions was counted for 10 min.

**Statistical analysis:**

Experimental values are expressed as mean ± SEM. Independent Sample t-test was carried out for statistical comparison. Statistical significance was considered to be indicated by a p value < 0.05 in all cases.

**Results and Discussion**

The herbal product Pegal Linu, when administered at doses of 25, 50, 100 and 200 mg per kg body weight demonstrated dose-dependent reductions in the number of abdominal constrictions in mice induced by intraperitoneal administration of acetic acid. The results were statistically significant at the three higher doses of 50, 100 and 200 mg per kg body weight. At the lowest dose of 25 mg per kg body weight, the number of abdominal constrictions (writhings) was less, but the result was not statistically significant. At the aforementioned four doses, the percent reductions in the number of constrictions were, respectively, 30.0, 33.4, 56.6, and 60.0. A standard antinociceptive drug, aspirin, by comparison, when administered at doses of 200 and 400 mg per kg body weight, reduced the number of abdominal constrictions in mice, respectively, by 33.4 and 66.6%. The results demonstrate that Pegal Linu is comparable to aspirin in terms of alleviation of gastric pain induced by acetic acid injection. The results are shown in Table 1.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg body weight)</th>
<th>Mean number of writhings</th>
<th>% inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Group 1)</td>
<td>10 ml</td>
<td>5.00 ± 0.26</td>
<td>-</td>
</tr>
<tr>
<td>Aspirin (Group 2)</td>
<td>200 mg</td>
<td>3.33 ± 0.56</td>
<td>33.4*</td>
</tr>
<tr>
<td>Aspirin (Group 3)</td>
<td>400 mg</td>
<td>1.67 ± 0.76</td>
<td>66.6*</td>
</tr>
<tr>
<td>Pegal Linu (Group 4)</td>
<td>25 mg</td>
<td>3.50 ± 0.92</td>
<td>30.0*</td>
</tr>
<tr>
<td>Pegal Linu (Group 5)</td>
<td>50 mg</td>
<td>3.33 ± 0.67</td>
<td>33.4*</td>
</tr>
<tr>
<td>Pegal Linu (Group 6)</td>
<td>100 mg</td>
<td>2.17 ± 0.54</td>
<td>56.6*</td>
</tr>
<tr>
<td>Pegal Linu (Group 7)</td>
<td>200 mg</td>
<td>2.00 ± 0.45</td>
<td>60.0*</td>
</tr>
</tbody>
</table>

All administrations (aspirin and Pegal Linu) were made orally. Values represented as mean ± SEM, (n=6); *P < 0.05; significant compared to control.
The herbal product, as per the information provided contains a number of plant components. Of the various plant components described, piperine is present in *Piper nigrum*. The analgesic activities of piperine have been reviewed (Ahmad et al., 2012). Analgesic property of the plant, *Boesenbergia rotunda* has also been reported (Ching et al., 2007). The analgesic and anti-pyretic activities of *Curcuma longa* (synonym: *Curcuma domestica*) rhizome extracts has been shown in rats (Neha et al., 2009). The anti-inflammatory and analgesic properties of *Zingiber officinale* rhizome extract has also been shown (Raji et al., 2002). Cumulatively speaking, the herbal product Pegal Linu can be said to contain a number of plant parts with reported analgesic properties, which can synergistically and so more effective give relief from pain. The product can therefore serve as a source of an effective and readily available herbal drug for the alleviation of both chronic and acute pain, and further merits scientific studies towards discovery of a more effective and safe medication for alleviation of pain.

Financial disclosure:

Authors of this study have no financial interest in any of the product(s) or manufacturer(s) mentioned in this article.

References


