Antipyretic activity of *Radix paeoniae*

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Abstract

The acetone extracts of *Radix paeoniae* (Paeonaceae) root (100 and 200 mg/kg orally) were tested in brewer’s yeast-induced pyrexia in rats to assess their antipyretic activity. The pyrexia in rats was reduced significantly (P < 0.05) compared to that of control. These results indicate that the extracts possess antipyretic properties. The root extract showed significant reduction in normal body temperature and yeast-provoked elevated temperature comparable to that of standard antipyretic drug paracetamol. The antipyretic effect was started at 1h and extended for at least 4h after the drug administration.

Key words: *Radix paeoniae*, Antipyretic activity and brewer’s yeast-induced pyrexia.

Introduction

*Radix Paeoniae* is the dried root of *Paeonia lactiflora* Pallas (Paeonaceae) Synonyms *Paeonia albiflora* Pallas., *P. edulis* Salisb., *P. officinalis* Thunb. Traditionally it is used for the treatment of atopic eczema, boils, and sores (1) to reduce fevers, induce sterility, and treat burns. When administered orally to mice, rabbits, and guinea pigs a decoction of the drug had antispasmodic effects on the ileum and uterus (2). With a methanol extract in rat uterus similar effects were observed (3), but an ethanol extract had uterine stimulant activity in rabbits (4). *Radix Paeoniae* extracts tested in vitro relaxed smooth muscles in both rat stomach and uterine assays (2). Inflammation in adjuvant-induced arthritis was inhibited by intragastric administration of a hot-water extract of *Radix paeoniae*.
to rats (5) and carrageenin induced paw oedema (6). Intragastric administration of hot-water or ethanol extracts of *Radix Paeoniae* to rats inhibited ADP-, arachidonic acid- and collagen-induced platelet aggregation, as well as endotoxin-induced disseminated intravascular coagulation (7,8,9). Similar effects were observed in rabbits and mice after intraperitoneal administration of the drug (10). Antifibrinolytic activity in vitro was observed, when tested by the standard fibrin plate method, ethanol and hot-water extracts of the drug (11). Intragastric administration of extracts of *Radix Paeoniae* protected the liver against carbon tetrachloride-induced hepato toxicity in mice and rats (12).

**Material and Methods**

**Plant Material**

The root of *Paeonia lactiflora* Pallas was collected from the Mandsaur, M.P. (India). The voucher specimens have been identified.

**Preparation of Extract**

Coarsely powdered dry roots were extracted with acetone by maceration at room temperature and for kept whole night. The whole extract was filtered and the solvents were evaporated for drying in vacuo to a residue at 40-45°C. The percentage yield of the prepared extract (residue) was 12% ± 0.51 (w/w). The Organoleptic properties test revealed that odour is slight (characteristic), taste is sightly sweet first and then astringent (bitter). The preliminary analysis of the residue was performed by the phytochemical group tests and the major constituent was observed as glycosides, flavonoids, tannins, terpenoids, triterpenoids, and complex polysaccharides that may all contribute to its medicinal effects.

**Animal used**

Adults Wistar albino rats of either sex weighing 180-200g each were used. The animals were kept in the standard metal cages in groups of 6 per cage, with free access to standard diet and water *ad libitum* in the animal house and maintained at room temperature under suitable nutritional and environmental conditions throughout the experiment. The Institutional Animal Ethics Committee reviewed the entire animal protocols prior to conducting the experiments.

**Study on normal body temperature**

Rats of either sex were divided into three groups comprising six in each group. The body temperature of each rat was measured rectally at predetermined time intervals before and for 4 hours after the administration of saline (vehicle control) or *Radix Paeoniae* Root extract at doses of 100 and 200mg/kg orally.

**Induction of fever by Yeast-induced pyrexia**

Rats were given 20 ml/kg (20%) suspension of brewer’s yeast subcutaneously. Initial rectal temperature was recorded. The
animal that showed an increase of 0.3–0.5°C in rectal temperature after 18 hours were selected. The test extract (100 and 200 mg/kg orally) was administered to two groups. Control group received 5 ml normal saline. Paracetamol (100 mg/kg orally) was used as reference drug. Rectal temperature was determined by thermal probe Ellab themistor thermometer 1, 2, 3 and 4 hr, after test extract /reference drug administration.

Results and Discussions

Effect of *R. paeoniae* acetone extract on normal body temperature in rats is shown in Table 1. It was found that the extract at a dose of 100 mg/kg caused significant lowering of body temperature at 4 h following its administration. This effect was maximal at dose of 200 also caused significant lowering of body temperature up to 4 h after its administration. The subcutaneous injection of yeast suspension markedly elevated the rectal temperature after 18 h of administration. Treatment with *R. paeoniae* extract at a dose of 100 and 200 mg/kg decreased the rectal temperature of the rats Table 2. The antipyretic effect started as early as 1 h and the effect was maintained for 4 h, after its administration. Both the standard drug paracetamol 100 mg/kg and tested *R. paeoniae* extract significantly reduced the yeast-elevated rectal temperature compared to control group.

Conclusion

As the available antipyretics, such as paracetamol, nimusulide etc. have toxic effect to the various organs of the body. So search for herbal remedies with potent antipyretic activity has received attention of researchers recently (13). The body’s ability to maintain a natural balance of COX 1 and 2 that regulate inflammatory response play a crucial role in supporting cardiovascular, immune, neurological, and joint and connective tissue systems (14). A number of plant extracts modulate enzymes of cyclooxygenase pathway, as reported with rosmarinic acid of *Rosmarinus officinalis* that inhibit leucotriene and prostaglandins synthesis, while COX-1 and COX-2 was inhibited by cirsilineol, cirsimaritin, apigenin, rosmarinic acid and eugenol of *Ocimum sanctum* similar to ibuprofen, naproxen, and aspirin (15). The results showed that the acetone extract of RPR possess a significant antipyretic effect in maintaining normal body temperature and reducing yeast-induced elevated body temperature in rats and its effect is comparable to that of the standard antipyretic drug paracetamol. Furthermore, there is significant reduction of yeast provoked elevated temperature of the tested animals by the extract at 200-mg/kg doses. Moreover, the statistical analysis with two-way ANOVA showed that the acetone extract of RPR decreases both the normal and yeast elevated body temperature in
a short span of time when compared with control group. However, more work is required to know the exact mechanisms of action of *Radix paeoniae* root extract and which fraction is responsible for antipyretic activity.

| Treatment       | Dose (mg/kg) | Rectal temperature (°C) before and after treatment |
|-----------------|--------------|--------------------------------------------------|
| Control (Saline)| 5 ml/kg      | 0 h: 37.6 ± 0.2, 1 h: 37.3 ± 0.1, 2 h: 37.3 ± 0.1, 3 h: 37.4 ± 0.3, 4 h: 37.0 ± 0.1 |
| Acetone Extract | 100          | 0 h: 37.4 ± 0.3, 1 h: 36.9 ± 0.1*, 2 h: 36.5 ± 0.1*, 3 h: 36.6 ± 0.2*, 4 h: 36.2 ± 0.1* |
| *R. paeoniae*    | 200          | 0 h: 37.3 ± 0.2, 1 h: 36.4 ± 0.1*, 2 h: 36.3 ± 0.1*, 3 h: 36.3 ± 0.1*, 4 h: 36.2 ± 0.1* |

Values are mean ± S.E.M. (n = 6), *P < 0.05 compared with control values

**Table 2:**
Antipyretic activity of Acetone extract of *R. paeoniae* root and paracetamol (100 mg/kg) on brewer’s yeast-induced pyrexia in rats

| Treatment       | Dose (mg/kg) | Rectal temperature (°C) before and after treatment |
|-----------------|--------------|--------------------------------------------------|
| Control (Saline)| 5 ml/kg      | 0 h: 37.6 ± 0.2, 18 h: 37.3 ± 0.1, 1 h: 39.1 ± 0.1, 2 h: 39.1 ± 0.2, 3 h: 39.1 ± 0.02, 4 h: 39.1 ± 0.01 |
| Acetone Extract | 100          | 0 h: 37.4 ± 0.3, 18 h: 36.9 ± 0.1*, 1 h: 38.5 ± 0.3, 2 h: 38.5 ± 0.2*, 3 h: 38.3 ± 0.1*, 4 h: 38.0 ± 0.2* |
| *R. paeoniae*    | 200          | 0 h: 37.6 ± 0.2, 18 h: 36.9 ± 0.1, 1 h: 38.1 ± 0.2*, 2 h: 38.1 ± 0.1, 3 h: 38.0 ± 0.1*, 4 h: 37.9 ± 0.3* |
| Paracetamol     | 100          | 0 h: 37.8 ± 0.2, 18 h: 39.5 ± 0.1, 1 h: 38.2 ± 0.3*, 2 h: 38.2 ± 0.2*, 3 h: 38.0 ± 0.4*, 4 h: 37.8 ± 0.3* |

Values are mean ± S.E.M. (n = 6), *P < 0.05

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