EVALUATION OF ANTI-PYRETIC AND ANALGESIC ACTIVITY OF CURCULIGO ORCHIOIDES GAERTN RHIZOMES.

PRANALI PANDIT*, P. BALARAJU, V. RAVIKANTH, M. SWETHA, M. SHIREESHA, K. NIKITHA REDDY

Department of Pharmacognosy, C. M. College of Pharmacy, R. R. Dist, Hyderabad-14, A.P, INDIA.

ABSTRACT:

Curculigo orchioides Gaertn. is a plant mentioned in Ayurveda, Unani as “anti-aging drug” i.e. it increases longevity of life. Owing to such usefulness of this plant attempt was made to evaluate antipyretic and analgesic activity of Methanolic extract (95%) in present study. Antipyretic activity was evaluated using yeast induced pyrexia. The results obtained revealed significant (p<0.05) antipyretic activity at 400mg/kg dose tested. Analgesic activity was evaluated using Eddy's hot plate method; acetic acid induced writhing method and heat conduction method. The analgesic activity was observed maximum at 750 mg/kg (significance p<0.001). The results of the present study demonstrate that methanolic extract of the rhizomes possess significant antipyretic and analgesic activity.

KEYWORDS: Anti-pyretic activity, Analgesic activity, Methanolic extract.

INTRODUCTION:

From ancient era herbs are said to be “God's gift” to man. They were used for the treatment of various diseases and for increasing longevity of life. (1) Herbal remedy has become most promising remedy in today’s era. Fever and pain are very regularly observed in today's stressful and unhealthy lifestyle. Allopathic medicines are giving promising action but they are having more side effects and moreover they are also costly. So there is always need to search herbal actives which promises better action. Curculigo orchioides Gaertn. is a plant mentioned in Ayurveda, Unani and Chinese system of medicines for its use in several disorders. (2-4) In Ayurveda it is mentioned as “anti-aging drug” i.e. it increases longevity of life. It is one of the ingredients in various antistress formulations. (5,6) According to chemical moieties present in plant, it is proposed that Curculigo orchioides Gaertn. may be beneficial in fever and pain symptoms. (7-17) Owing to such usefulness of this plant attempt was made to evaluate antipyretic and analgesic activity in the present study.

MATERIALS AND METHODS:

Collection of plant material

Dried rhizomes and roots of Curculigo orchioides Gaertn. were collected from local fields of Choutuppal area. The plant was identified and authenticated from the department of botany Osmania University. S. no. 116, Voucher number: 1050, Date: 29-01-2011. Referred from the Flora Of The Presidensy of Madras Vol-III, Reprinted Edition - 1957.
Preparation of extract

Rhizomes were extracted by continuous hot extraction (Soxhlet) method. The resulting extracts were concentrated under reduced pressure and controlled temperature by rotary flash evaporator followed by freeze drying and stored in a desiccator.

Animals

Albino mice weighing 20-25 gm and Albino Rats weighing 160 -200gm of either sex were used for study. They were housed and acclimatized to the standard laboratory conditions. All the experiments were performed in light period and were conducted according to the CPCSEA regulations, India (CPCSEA No. 1217/a/08/CPCSEA).

Acute toxicity study in mice

Acute toxicity study of Curculigo orchioides Gaertn. was carried out in mice 1gm of methanolic extract was suspended in 2 ml of saline solution and dosing was given as per body weight of the animal. Maximum dose of 10g/kg (p.o.) bodyweight of Curculigo extract was given to animals and were observed for a period of 72 h for behavioral changes, toxic reactions and mortality.

EVALUATION OF ANTI-PYRETIC ACTIVITY (18)

Yeast-induced pyrexia

Albino rats were divided into four groups each containing six rats, fever was induced by injecting 20 mg/kg (subcutaneously) of 20% suspension of yeast in normal saline below the nape of the neck. Initial rectal temperature was recorded. After 18 h, animals that showed an increase of 0.3-0.5°C in rectal temperature were selected. The test extracts 200mg/kg, 400mg/kg (p.o.) and reference standard Aspirin (100mg/kg, i. p.) and control saline vehicle were administered orally. The rectal temperature was measured with thermometer at 0, 1, 2,3,4,5 and 6 hours post dosing.

EVALUATION OF ANALGESIC ACTIVITY (19,20)

Eddy’s hot plate method

Albino mice were divided into five groups each containing six mice. Animals were divided in to control, standard Diclofenac sodium (9 mg/kg i.p.) and test groups (Curculigo 250, 500 and 750 mg/kg p.o. respectively). The animals were individually placed on the hot plate maintained at 55°C, one hour after their respective treatments. The response time was noted as the time at which animals reacted to the pain stimulus either by paw licking or jump response. Whichever appeared first, the cut off time for the reaction was 15 seconds and it is observed for every half an hour up to 3 hours.

Acetic acid induced writhing-reflex method in mice

Albino mice were divided into five groups each containing six mice. Standard drug Aspirin (300mg/kg i. p.) and the methanolic extracts (250mg/kg, 500mg/kg and 750mg/kg, p.o.) were given 30 minutes prior to the administration of the writhing agent (0.3ml of 0.3% v/v acetic acid to each group). The number of writhing movements produce in the animal was observed for 30 minutes and compared with control drug. The percent was calculated using the following ratio:

\[
\% \text{ of protection} = \frac{\text{Control mean} - \text{treated mean}}{\text{Control mean}} \times 100
\]
dipped up to 5 cm into hot water maintained at 58°C. The response time was noted as the sudden withdrawal of the tail from the hot water. Cut off time of 10 seconds was maintained to avoid damage to the tail for all groups. The time required for flicking of the tail, was recorded, to assess response to noxious stimulus.

RESULTS:

Oral administration of methanolic extract of *Curculigo Orchioides* Gaertn. 10 g/kg did not produce any adverse effect or lethality in mice.

ANTI-PYRETIC ACTIVITY

Administration of methanolic extract *Curculigo orchioides* Gaertn. (200 and 400mg/kg p.o.) produced a significant (p<0.05) antipyretic activity at 400mg/kg doses compared to control. However, the extent of temperature regulation in rats treated with 400 mg/kg showed lesser than Aspirin (100 mg/kg) treated group. In time course, rats treated with Curculigo 400 mg/kg and Aspirin (100 mg/kg) elicited maximum temperature regulation at 6 h after administration of respected drugs in pyrexia induced rats. (Figure 1)

Figure 1: Antipyretic activity (yeast induced pyrexia method) of methanolic extract of *curculigo orchioide rhizomes* in rats.

![Antipyretic activity of methanolic extract of Curculigo orchioides rhizomes](image)

(Values are mean ± SEM from 6 rats in each group)

*Statistically significant at p<0.05, * statistically significant at p<0.01, **statistically significant at p<0.001 all the values are compared with control.

ANALGESIC ACTIVITY

*Eddy’s hot plate:*

Pretreatment with *Curculigo orchioides* Gaertn. methanolic extract (250, 500 and 750 mg/kg p.o.) shows analgesic effect as compared to control. Significant dose dependent effect was observed in treated (250, 500 and 750 mg/kg p.o.) mice comparatively lesser than Diclofenac sodium (9 mg/kg i.p.). The latency period of pain induced by heating of hot plate was observed prolonged at 1 hr and 1.5 hr for treated (250, 500 and 750 mg/kg p.o.) and Diclofenac sodium (9 mg/kg i.p.). (Figure 2)
Figure 2: Analgesic activity (hot plate method) of methanolic extract of curculigo orchioides rhizomes in rats.
(Values are mean ± SEM from 6 rats in each group)

Acetic Acid Induced Writhing Method

Pretreatment with methanolic extract (250, 500 and 750 mg/kg p.o.) had significant dose dependent effect for preventing acetic acid induced writhing movements in mice. Inhibitory effect of Diclofenac sodium (9 mg/kg i.p.) on acetic acid was greater than methanolic extract (250, 500 and 750 mg/kg p.o.). (Table 1)

Table 1: % protection against acetic acid induced writhing of methanolic extract of curculigo orchioides rhizomes in mice.

<table>
<thead>
<tr>
<th>Dose</th>
<th>% of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>84.39</td>
</tr>
<tr>
<td>250mg/kg</td>
<td>9.82</td>
</tr>
<tr>
<td>500mg/kg</td>
<td>41.034</td>
</tr>
<tr>
<td>750mg/kg</td>
<td>58.38</td>
</tr>
</tbody>
</table>

Heat conduction method

Curculigo orchioides Gaertn. methanolic extract (250, 500 and 750 mg/kg p.o.) shows analgesic effect as compared to control. Significant dose dependent effect observed in treated mice was comparatively lesser than Diclofenac sodium (9 mg/kg i.p.). (Figure 3)
Figure 3: Analgesic activity (Heat conduction method) of methanolic extract of *curculigo orchioides* rhizomes in rats. 
(Values are mean ± SEM from 6 rats in each group)

**DISCUSSION:**

The hypothalamus regulates body temperature with a delicate balance between heat production and heat loss through the set-point control. Hypothalamus biochemically, during fever, enhanced formation of cytokines such as interleukins (IL-1α, IL-1β, IL-6 and IL-6), interferon (α,β), tumor necrosis factor alpha (TNF-α). These cytokines migrates to circum ventricular organs of the brain and bind with endothelial receptors on vessel walls or interact with local microglial cells. After binding, it activates the arachidonic acid pathway which enhances the synthesis of prostaglandin E2 (PGE2). The pathway consists of the enzymes phospholipase A2, cyclo-oxygenase-2 (COX-2) and prostaglandin E2 synthase, which are responsible for the synthesis and release of PGE2. PGE2 is the final mediator for febrile response. The set point temperature of the body remains elevated until PGE2 is present in the hypothalamus. Again, PGE2 triggers the hypothalamus for more formation of heat by minimizing heat loss through cyclic adenosine monophosphate (cAMP) pathways. It has been established that yeast induces pathogenic fever in rat by enhancing the production of prostaglandins, mainly PGE2, which elevates the set point of the thermoregulatory center in hypothalamus. Furthermore, indirect evidence seems to support the influence of drug on the biosynthesis of prostaglandin (PGE2) which is a regulator of body temperature; this may also partly account for its antipyretic activity in yeast-induced pyrexia model. In the present study, *Curculigo orchioides* Gaertn. produces antipyretic activity at 400mg/kg significantly.

The analgesic effect of *Curculigo orchioides* Gaertn. methanolic extract was investigated using hot plate, acetic acid induced writhing and heat conduction tests. In the present study, our results
revealed that Curculigo extract has significant dose dependent effect against pain response. Analgesic action in hot plate and heat conduction tests involves supraspinal and spinal components, respectively, it means Curculigo orchioides Gaertn produces an inhibitory effect on the nociceptive response like centrally acting drugs.

Acetic acid causes irritation in the peritoneum, resulting in vasodilation and liberation of histamine and nitric acid, which leads to visceral pain. Since Curculigo orchioides Gaertn. has been proved significant antihistaminic activity. Drug was selected for studying analgesic activity and it showed significant dose dependent reduction in writhing movement induced by acetic acid.

Methanolic extract of Curculigo orchioides Gaertn. has demonstrated promising antipyretic and analgesic activity. This study paves the way for attention in investigating characterization and purification of active principles from Curculigo orchioides Gaertn. for successful development of drug for clinical use.

REFERENCES:
17. Zhongguo Z. Yao Z. Determination of Curculigoside in Crude Medicine Curculigo


22. Viklicy L. Bonica JJ. Advances in pain research and therapy techniques for the study of pain in animal. New York; Raven Press; 1979; 220.