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# Analgesic and anti-inflammatory activity of *Couroupita guianensis* Aubl.

**M. Geetha*, A. K. Saluja, M. B. Shankar, R. S. Mehta**

A. R. College and G. H. Patel Institute of Pharmacy, PO Box No. 19, Vallabh Vidyanagar, Gujarat - 388 120.

**Abstract**

Objective: To study analgesic and anti-inflammatory activity of various extracts of flowers and bark of *Couroupita guianensis* Aubl. Materials and methods: Analgesic activity was evaluated using tail flick method and anti-inflammatory activity was screened by measuring the reduction in carrageenan induced hind paw oedema. The potency of various extracts of flower and bark were compared with (i) paracetamol (200 mg/kg) for analgesic and (ii) indomethacin (10 mg/kg) for anti-inflammatory activities. Results: All the extracts of *C. guianensis* showed analgesic and anti-inflammatory activity. The peak analgesic effect of flower was seen after 1 h while bark extracts showed peak effect after 2 h. Maximum reduction in inflammation by the extracts was observed after 3 h. Conclusion: *C. guianensis* is almost equipotent to paracetamol in its analgesic activity and to indomethacin in its anti-inflammatory activity. So it can be recommended for further studies.

**Key words:** *Couroupita guianensis*, Analgesic activity, Anti-inflammatory activity, Paracetamol, Indomethacin.

## 1. Introduction

*Couroupita guianensis* Aubl. [Lecythidaceae] is grown in Indian gardens as an ornamental tree for its beautiful flowers. It is also known as cannon ball tree in English, and *kailaspati* in Hindi [1]. Fresh fruit pulp is used in preparation of cooling medicinal drink and various parts are useful in skin disease. Recently it has been shown that petroleum ether and methanol extracts of aerial part of *C. guianensis* possesses antibacterial [2], anti-malarial and anthelmintic activity [3]. α, β-amyrin and β-sitosterol were isolated from bark [4]. An alkaloid courapitine, stigmasterol and campesterol were isolated from fruit [5,6], volatile constituents isolated from the flowers [7]. The aim of the study was to screen the bark and flower of *Couroupita guianensis* for analgesic and anti-inflammatory effect in order to establish its folklore use in Gujarat [8]

## 2. Materials and methods

The bark and flowers of *C. guianensis* were collected from the Botanical garden Sardar Patel University, Vallabh Vidyanagar, in the month

* Corresponding author
E-mail: mbs_mg@yahoo.co.in

of March and April. The plant was authenticated and voucher specimen of flower and bark were submitted to the Department of Pharmacognosy, A. R. College and G. H. Patel Institute of Pharmacy, Vallabh Vidyanagar. They were shade dried and ground thoroughly in a mill to obtain coarse powder.

The powdered material was extracted with benzene, ethanol [95%] in a Soxhlet's apparatus using continuous hot percolation method followed by extraction with water. The individual extracts were collected and concentrated by evaporation.

Qualitative tests were performed for all the extracts. Benzene extracts of flowers showed presence of fixed oil and phytosterols whereas ethanol extract showed carbohydrates, saponins and flavanoids and water extract showed presence of flavanoids, tannins and glycosides.

In case of bark, the benzene extract showed presence of phytosterols, alcohol and water extract showed presence of alkaloid, saponins, tannins and glycosides. All the extracts were evaluated for their analgesic and anti-inflammatory effect.

*2.1 Evaluation of Analgesic activity*

Wistar albino rats of either sex (180-200 gm) were used for the study. The animals were housed and acclimatized under standard laboratory conditions and were supplied with food and water *ad lib.* The animals were segregated into eight groups of six animals each. Group 1 received 0.5 ml/kg of Tween 80 solution (5% w/v) severed as control. Group 2 received paracetamol at the dose of 200 mg/kg as standard analgesic drug. Group 3, 4 and 5 received benzene, ethanol and water extracts of flowers at a dose of 250 mg/kg respectively.

Where as Group 6, 7 and 8 received benzene ethanol and water extracts of bark at a dose of 250 mg/kg respectively. The dried extracts were formulated as suspension in distilled water using Tween 80 (5% w/v) as suspending agent. All the extracts were administered orally using intragastric tube. The pain threshold was measured at 0, 1, 2, 3 and 4 h after administration of test sample and standard solution.

Tail flick method [9] was employed for the evaluation of analgesic activity. Each rat was conditioned in the restrainer for 30 min. The tail was cleaned with spirit. Radiant heat (45° ± 2°C) was focused onto the ventral surface of the tail (approximately 5 cm from the caudal end of the tail) and the tail flick latency (TFL) was noted using the Tail Flick Analgesia Monitor (Techno electronics, Lucknow).

The procedure was repeated thrice at an interval of 5 min. The cut off time was set at 30 sec to avoid tissue damage. The mean of three observations was taken as the basal TFL. The data obtained was analyzed using Student's *t* - test (Table 1).

*2.2 Evaluation of Anti-inflammatory activity*

The number of groups and animals per group were similar to analgesic activity. Group 3, 4 and 5 received benzene, ethanol and water extracts of flowers, where as Group 6, 7 and 8 received benzene, ethanol and water extracts of bark respectively at a dose similar to analgesic activity.

In this method, second group received indomethacin at the dose of 10 mg/kg as standard anti-inflammatory drug. Various extracts were orally administered as described in analgesic activity. The anti-inflammatory activity was evaluated by determining the reduction in carrageenan induced hind paw oedema [10].

After 1 h of drug administration carrageenan (0.1ml, 1 % suspension) was injected into the sub plantar region of the right hind paw of each

Table 1
Analgesic activity of different extracts of flowers and bark of *C. guianensis* in rats (in seconds).

| Drug | 0 h | 1 h | 2 h | 3 h | 4 h |
|---|---|---|---|---|---|
| Control | 4.5 ±0.18 | 4.4 ±0.11 | 4.1 ±0.25 | 4.3 ±0.31 | 4.5 ±0.22 |
| Paracetamol Flowers. | 4.7 ±0.26 | 13.5 ±1.01[b] | 17.0 ±0.58[b] | 17.2 ±0.6[b] | 10.3 ±0.33 |
| Benzene Ext. | 6.6 ±0.88 | 9.3 ±0.3[a] | 6.2 ±0.65 | 6.2 ±0.52 | 5.8 ±0.23 |
| Ethanol Ext. | 4.2 ±0.35 | 10.2 ±0.21[a] | 10.8 ±0.51[a] | 8.2 ±0.26 | 5.0 ±0.14 |
| Aqueous Ext Bark. | 4.3 ±0.75 | 12.3 ±0.16[a] | 10.5 ±0.79[a] | 9.3 ±0.33[a] | 4.7 ±0.39 |
| Benzene Ext. | 4.2 ±0.45 | 5.2 ±0.23 | 12.3 ±0.33[a] | 6.8 ±0.44 | 6.8 ±1.04 |
| Ethanol Ext. | 4.1 ±0.32 | 4.6 ±0.41 | 14.2 ±0.22[b] | 8.7 ±0.36 | 7.1 ±0.62 |
| Aqueous Ext. | 3.0 ±0.57 | 4.3 ±0.63 | 15.8 ±1.07[b] | 7.5 ±0.86 | 6.5 ±0.76 |

Values are expressed as mean ± SD; n = 6 , p values ; a<0.01, b<0.001

Table 2
Anti-inflammatory activity of different extracts of flowers and bark of *C. guianensis* on carrageenan induced paw oedema in rats.

| Drug | Mean paw volume [ml] | | | |
|---|---|---|---|---|
| | 0 h | 1 h | 2 h | 3 h |
| Control | 0.80 ±0.02 | 0.82 ±0.04 | 0.88 ±0.04 | 0.96 ±0.02 |
| Indomethacin Flowers | 0.45 ±0.02 | 0.11 ±0.03[b] | 0.10 ±0.02[b] | 0.09 ±0.02[b] |
| Benzene Ext. | 0.58 ±0.08 | 0.24 ±0.01 | 0.22 ±0.06[a] | 0.16 ±0.08[b] |
| Ethanol Ext. | 0.61 ±0.02 | 0.51 ±0.08 | 0.45 ±0.07 | 0.42 ±0.05 |
| Aqueous Ext. Bark | 0.60 ±0.05 | 0.45 ±0.09 | 0.33 ±0.06 | 0.31 ±0.05[a] |
| Benzene Ext. | 0.48 ±0.03 | 0.40 ±0.05 | 0.17±0.02[b] | 0.14 ±0.01[b] |
| Ethanol Ext. | 0.62 ±0.07 | 0.53 ±0.08 | 0.32 ±0.07[a] | 0.29 ±0.01[a] |
| Aqueous Ext. | 0.50 ±0.01 | 0.38 ±0.06 | 0.21 ±0.09[a] | 0.19 ±0.08[b] |

Values are expressed as mean ± SD; n = 6, p values ; a<0.01, b<0.001

rat. The paw volumes were measured at 0, 1, 2 and 3 h intervals, with the help of plethysmograph. The change from the initial paw volume in ml after the administration of carrageenan was noted in each animal. The change after 1, 2 and 3 h in the treated groups were compared with the control group. The data obtained was analyzed using Student's *t* - test (Table 2).

## 3. Results and discussion

All the extracts of *C. guianensis* showed analgesic activity, which is comparable to that of paracetamol at the dose of 250 mg/kg (Table 1). The peak effect in all the extracts of flower was seen after 1h, while bark extracts showed peak effect after 2 h. This could be due to more availability of active principle/s in the flower.

All the extracts showed anti-inflammatory activity which is comparable to that of indomethacin at the dose of 10 mg/kg. (Table 2). The peak effect of all the extracts of flower and bark of *C. guianensis* was seen after 3 h. In case of bark, benzene and aqueous extracts showed marked reduction in the inflammation.

## 4. Conclusion

From this study, it can be concluded that flower and bark of *C. guianensis* possesses marked analgesic and anti-inflammatory activity and is equipotent to standard drugs. The present study establishes effectiveness and pharmacological rationale for use of *C. guianensis* in folklore medicine as analgesic and anti-inflammatory drug. Thus the plant can be further explored for its phytochemical profile to identify the active constituents responsible for the above mentioned activities.

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