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Evaluation of analgesic and antipyretic activities of various leaf extracts of *Oroxylum indicum* (L.) *vent*

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ABSTRACT: Background: The ethnobotanical survey and traditional information revealed that the *Oroxylum indicum* possesses antipyretic, analgesic, anti-inflammatory and diuretic activities. **Aim:** The present study was an attempt to investigate the analgesic & antipyretic activity of various extracts of *Oroxylum indicum* leaves. **Methods:** The analgesic activity of *O. indicum* extracts was evaluated on albino mice by tail immersion methods. Whereas antipyretic activity was studied on Brewer's yeast-induced pyrexia in Wister strain albino rats. All the crude extracts of *O. indicum* such as petroleum ether, chloroform and ethanol were tested for analgesic and antipyretic activity at 100 and 200 mg/kg body weight. Aspirin (50mg/kg) and Paracetamol (100 mg/kg) were used as standard drugs for analgesic and antipyretic activities respectively. **Results:** Among the entire extract pet. ether and ethanol extract shows significant action in a dose of 200 mg/Kg body weight. Whereas ethanol extract in a dose of 200 mg/Kg body weight exhibited significant antipyretic activity after 30 and 45 min as compared to standard paracetamol drug. **Conclusion:** These findings demonstrate that *O. indicum* leaves have remarkable analgesic and antipyretic activities when compared with positive control and thus have great potential as a source for natural health. The data were verified as statistically significant by using one way ANOVA (analysis of variance) at 5 % level of significance ($p<0.05$).

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INTRODUCTIONS:

Analgesics are defined as the substances which decreases pain sensation by increasing pain threshold to external stimuli. Noxious pain stimuli can be developed by thermal, chemical and physical pressures. The literature survey reveals that there are no reports on the analgesic & antipyretic activity of the leaf extracts of *Oroxylum indicum.* This prompted the authors to undergo the present study. The tribal areas of Baipariguda, Koraput (District) of Eastern Orissa, due to

its unique varieties geographical and climatic factors has had a rich variety of medicinal plant. *Oroxylum indicum* (family: *Bignoniaceae*) also known as Phana Phena (Oriya) is frecuntly distributed. And extensively used by the tribal people. *Oroxylum indicum* (L.) *Vent* is a small or medium sized deciduous tree that grows upto a height of 12 m, with soft light brown or greyish brown bark with corky lenticels [1]. The leaves are very large, 90-180 cm long, 2-3 pinnate with 5 or more pairs of primary pinnae, rachis very stout, cylindrical, swollen at the junction of branches, leaflets 2-4 pairs ovate or elliptic, acuminate, glabrous.

The large leaf stalks wither and fall off the tree and collect near the base of the trunk, appearing to look like a pile of broken limb bones. The flowers are reddish purple outside and pale, pinkish-yellow within, numerous, in large erect racemes [2]. Fruits are flat capsules, 0.33-1 m long and 5-10 cm broad and sword shaped. Seeds are numerous, 6 cm long, winged all round except at the base .In India, it is distributed in the Himalayan foothills, Eastern and Western Ghats and North East India [3,4]. Many other compounds namely oroxyloside methyl ester and chrysin-7-O-methyl glucoside in leaves and stem bark and an anthraquinone, aloe-emodin in leaves [5] were also reported from this plant. Analysis of phyto constituents on various extracts of different parts of the plant revealed the presence of flavonoids, alkaloids, saponins, tannins, glycosides, streols, fats and oils in high, moderate and low concentrations [6,7].

The root bark of *Oroxylum indicum* is acrid, bitter, pungent, astringent to the bowels, cooling, aphrodisiac, tonic, increases appetite, useful in biliousness, fevers, bronchitis, intestinal worms, vomiting, dysentery, leucoderma, asthma, inflammation, anal troubles. It is used to treat diarrhoea, dysentery, diaphoretic and rheumatism [8].

Leaves are used as stomachic, carminative and flatulent. Leaf decoction is given in treating rheumatic pain, enlarged spleen [9], ulcer, cough and bronchitis. The fruits are acrid, sweet, antihelminthic, and effective in diseases of the throat and heart, piles, bronchitis, used as expectorant, improves appetite and is used in leucoderma [10].

MATERIALS:

Aspirin and Paracetamol was procured as gift sample from Taj Pharmaceuticals Ltd, Mumbai, India and all other chemicals reagents used in present work were of analytical grade and procured from authorized dealer.

METHODS:

Collection of Plant Material:

The leaves of *Oroxylum indicum* were collected from the tribal belts of the local area of Baipariguda of Koraput district (India) in the month of January 2018.The plant was identified, confirmed and authenticated by the Biju Patnaik Medicinal Plants Garden and Research Centre, Dr. M. S. Swami Nathan Research Foundation, Jeypore, Koraput (District), Orissa (Letter No. MJ/SS/P-605/18, dated (7.2.2018). After authentification leaves were collected in bulk and washed under running tap water to remove adhering dirt. Then the leaves were shade dried. The dried materials were made into coarse powder by grinding in mechanical grinder and stored in a closed air tight container for further use.

Table 1. Phytochemical screening for the different solvent extracts of *O. indicum leaves.*

Phyto-constitunets	Pet. ether extract	Chloroform extract	Ethanol extract
Alkaloids	+++	++	+
Flavonoids	+++	++	+
Glycosides	++	+	+++
Saponins	++	--	+
Tannins	+	---	++
Phenolic compound	++	+	++
Carbohydrates	--	--	--

+++ (Strong), ++ (Moderately), + (poor) and – (Absent).

Preparation of Extracts:

The coarse powder was taken in Soxhlet apparatus and extracted successively with ethanol, ethyl acetate, n-butanol and petroleum ether as solvent. A total amount of 250 g coarse powder was extracted with 500 ml of each solvent. For each solvent, 10 cycles were run to obtain thick slurry. Each slurry was then concentrated under reduced pressure to obtain crude extract. All crude extracts were kept in closed air tight containers under cool and dark place for further study [11,12].

Phytochemical investigation:

The crude petroleum ether, chloroform and ethanol extracts of the leaf of *O. indicum* were subjected to preliminary phytochemical analysis in order to detect the presence of various groups of phytoconstituents by carrying out the chemical analysis [12,13].

Evaluation of Analgesic Activity:

Animals:

Healthy Swiss albino mice (20-50 g) of either sex and Wister strain albino rats weighing (150-200 g) were used for both of the study .They were housed in standard conditions of temperature (25±2 °C), 12 h light per day cycle, relative humidity of 45-55 % in animal house of Jeypore College of Pharmacy. They were fed with standard pellets of food and water. Animals were kept and all operation on animals was done in aseptic condition.

Drugs:

Aspirin (50 mg/kg) and Paracetamol (100 mg/kg) was used as standard drugs. A dose of 100 mg/kg and 200 mg/kg of different *Oroxylum indicum* leave extracts used for activity study. The doses were prepared in 1% aqueous suspension of gum acacia and route of administration for standard and test was i.p. and oral route.

Experimental protocol:

Animals were selected, weighed (25-30 g) and divided in to five groups (n=6), namely control, standard drug and three groups belonging to three different extract of *O. indicum*. All the studies conducted were approved by the Institutional Ethical Committee (1906/PO/Re/S/16/CPCSEA), Jeypore College of Pharmacy, Jeypore, Odisha according to prescribed guide-lines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

Evaluation of Analgesic Activity (Tail Immersion Method):

The tail immersion method was used to evaluate the central mechanism of analgesic activity. Here the painful reactions in animals were produced by thermal stimulus that is by dipping the tip of the tail in hot water Albino mice were divided in to five groups of six animals each. The animals were fasted for 16 h with water *ad libitum*. The Group I was served as solvent control which received the vehicle 0.5 % carboxy methyl cellulose (0.1ml/10Kg) through oral route, the Group II was served as reference control which received Aspirin (50 mg/Kg) and group III to V were received in a dose of 200 mg/Kg each the extracts of pet. Ether, chloroform and ethanol. After administration of above drug, the basal reaction time was measured after in a regular interval of 30 min, by immersing the tail tips of the mice (Last 1-2 cm) in hot water heated at temperature of temperature (55 ± 1) °C. The actual flick responses of mice i.e. time taken in second to withdrawn it's from hot water source was calculated and result were compared with control Group [14-16].

Table 2. Analgesic activity of leaf extracts of *Oroxylum indicum*.

Groups	Dose (mg/kg)	Tail Flick Latency (s) (X ± SD)		
		15	30	45
I	--	0.06±0.14	0.07±0.27	0.08±0.012
II	50	6.09±0.16	8.67±0.18	10.12±0.16
III	200	4.63±0.27	6.67±0.23	7.22±0.07
IV	200	0.91±0.37	1.58±0.27	2.71±0.33
V	200	5.53±0.41	7.91±0.21	9.02±0.23

Groups 1 to V were treated with normal saline water, aspirin, pet. Ether, chloroform and ethanol extracts. All data are expressed as mean ± standard deviation.

Antipyretic activity by Yeast induced pyrexia:

For studying antipyretic activity of albino rats weighing 150-200 g were selected and divided into eight groups containing six animals in each group were used for yeast induced pyrexia models**.** Group I animals received 1 ml/kg body weight of normal saline orally and served as control group. Group II animals were treated with paracetamol by intraperitoneal injection in the dose of 100 mg/kg body weight and served as standard group. The animals of group III two VIII received the pet. Ether, chloroform and ethanol of leaf extract of *Oroxylum indicum* orally (100 and 200 mg/kg body weight) to the respective groups of animals. In the beginning of the experiment normal rectal temperatures was noted by inserting 2 cm of digital thermometer, lubricated with glycerine into the rectum. Pyrexia was induced by i.p. injection of 2 ml/kg body weight of 15 % brewer's yeast suspension in normal saline. The animals were then fasted for the duration of experiment (approx 24 h). After 18 h of yeast injection, extracts (100 and 200 mg/kg body weight) are given to the respective test group animals then the basal temperatures were recorded for all the groups of animals by inserting 2 cm of digital thermometer, lubricated with glycerin into the rectum. The rectal temperatures of all the animals were noted at 30 min of intervals till 3 h [17-19].

Table 3. Effect of various leaf extracts of *O. indicum* against yeast induced pyrexia in rats in 30 min.

Groups	Dose (mg/Kg)	IBT (ºC) (X±SD)	Basal Temp. (ºC) (X± SD)	30 min (ºC) (X± SD)
I	--	39.3±0.09	38.4±0.7	39.4±0.11
II	100	37.6±0.12	38.5±0.06	38.2±0.07
III	100	36.4±0.14	37.2±0.26	37.5±0.21
IV	200	37.4±0.14	38.5±0.16	37.6±0.12
V	100	36.4±0.21	37.3±0.12	38.6±0.18
VI	200	36.4±0.21	37.2±0.12	38.5±0.27
VII	100	36.4±0.18	37.2±0.14	38.3±0.11
VII	200	37.2±0.11	38.4±0.16	37.6±0.27

Statistical analysis:

The data on biological studies were reported as mean ± Standard Deviation (n=6). For determining the statistical significance, standard error mean and ANOVA at 5 % level of significance was employed. The 'p' values < 0.05 were considered significant [20].

Table 4. Effect of various leaf extracts of *O. indicum* against yeast induced pyrexia in rats in 90, 120 and 180 min.

Groups	60 min (ºC) (X± SD)	90 min (ºC) (X± SD)	120 min (ºC) (X± SD)	180 min (ºC) (X± SD)
I	38.4±0.12	39.4±0.14	38.5±0.18	39.1±0.12
II	38.3±0.11	37.4±0.09	37.1±0.14	37.3±0.18
III	37.3±0.14	38.2±0.31	39.3±0.28	39.2±0.24
IV	38.2±0.17	38.2±0.06	37.6±0.18	37.1±0.11
V	38.2±0.16	39.7±0.24	39.5±0.31	39.2±0.16
VI	38.5±0.23	38.5±0.31	39.5±0.14	39.6±0.16
VII	37.2±0.11	38.8±0.12	38.2±0.17	38.4±0.23
VII	37.7±0.22	37.4±0.14	37.3±0.11	38.2±0.14

RESULTS AND DISCUSSIONS:

The phytochemical study revealed that the presence of alkaloids, flavonoids, glycosides, saponins, tannins and phenolic compounds were present in all three extract except Carbohydrate as given in Table 1. All so in present study three extracts (pet. ether, chloroform and ethanol) of leaves part of *Oroxylum indicum* were studied for analgesic (By tail flick method) and antipyretic activity (by yeast induced pyrexia method). The effect of various leaf extracts of *Oroxylum indicum* shown in table 1, 2 and 3 respectively. The extract of pet. ether and ethanol showd significant analgesic effect than chloroform extract in a dose of 200 mg/kg body weight as compared to standard drug Aspirinin in a dose of (50 mg/kg). Similarly pet. ether and ethanolic extract of leaf of *Oroxylum indicum* showd significant antipyretic activity in a dose of 200 mg/kg body weight as compared to standard drug paracetamol in a dose of (100 mg/kg). The results obtained from both standards and extracts treated groups were compared with the control group. A significant reduction in the yeast elevated rectal temperature was observed in the test drug.

CONCLUSION:

On the basis of present study, we may conclude that *Oroxylum indicum* leaf produces significant analgesic and antipyretic activities in dose dependent manner on animal models, so the traditional use has been pharmacologically validated. Since, *Oroxylum indicum* leaves showed remarkable activity when compared with standard drugs. Therefore, *Oroxylum indicum* leaves can be a substitute of synthetic analgesic or antipyretic drugs having adverse effects.

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REFERENCES:

1. Dalal NV, Rai VR. *In vitro* propagation of *Oroxylum indicum* Vent. a medicinally important forest tree. J Forest Res, 2004; 9: 61-65.
2. Gokhale M, Bansal YK. An avowal of importance of endangered tree *Oroxylum indicum* (Linn.) Vent. Nat Product Radiance, 2006; 5(2): 112-114.
3. Kirtikar KR, Basu DD. Vol 4. Dehradun: Indian medicinal plants Oriental enterprises; 2001. pp. 1105-1107.
4. Jayaram K, Prasad MN. Genetic diversity in *Oroxylum indicum* (L.) Vent (*Bignoniaceae*), a vulnerable medicinal plant by random amplified polymorphic DNA marker. Afr J Biotech, 2008; 7: 254-262.
5. Lawania RD, Mishra A, Gupta R. *Oroxylum indicum*: a Review. Pharmacol J, 2010; 2(9): 304-310.
6. Ramaswamy N, Samatha T, Srinivas P, Chary RS. Phytochemical screening and TLC studies of leaves

and petioles of *Oroxylum indicum* (L.) Kurz an endangered ethno medicinal tree. Int J Pharm Life Sci, 2014; 4(1): 2306-2313.
7. Bisht A, Zaman K, Singh M, Gupta R, Singh V. Pharmacological studies on *Oroxylum indicum* (Linn.) Vent. stem bark. Indian J Nat Prod Resourc, 2011; 2(4): 472-478.
8. Prakash P. Indian medicinal plants. New Delhi: Chaukhamba Sanskrit Pratishthan; 2005. pp. 248-249.
9. Khare CP. *Oroxylum indicum.* In: Khare CP, editor. Indian Herbal Remedies Rational western therapy: Ayurvedic and other traditional usage. 4th ed. New York: Springer-Verlag Berlin Heidelberg; 2004. pp. 340-341.
10. Drury CH. Ayurvedic useful plants of India. New Delhi: Asiatic Publishing House; 2006. pp. 360-365.
11. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. Pune: Nirali Prakashan; 2007. pp. 122-135.
12. Harbone JB. Phytochemical methods. London: Chapman and Hall Ltd; 1973. pp. 49-188.
13. Trease GE, Evans WC. Trease and Evans Pharmacognosy, A Physician's Guide to Herbal Medicine. 13th ed. London: Bailliere Tindall; 1989. pp. 912-918.
14. Tripathi KD. Essential of Medical Pharmacology. 5th ed. New Delhi: Jayapee Brother Medical Publisher; 2003. pp. 219-220.
15. Upudha AL, Rathnakar UP, Udupa S. Anti-inflammatory, Anti-pyretic and Analgesic effect of *Tamrindus indica*. Indian Drug, 2007; 44(6): 466-470.
16. Toma W, Graciosa JS, *et al*. Evaluation of the analgesic and antiedematogenic activities of *Quassia amara* bark extract. J Ethnopharmacol, 2003; 85: 19-23.
17. Franzotti EM, Santos CVF, Rodrigues HMSL, Mourao RHV, Andrade MR; Antoniolli AR. Antiinflammatory, analgesic activity and acute toxicity of *Sida cordifolia* L. (Malva- branca). J Ethnopharmacol, 2000; 72: 273-278.
18. Pal SC, Nandy A. Anti-inflammatory, analgesic and antipyretic activity of *Achras Sapota Linn*. Leaf extracts and its isolated compounds. Indian Drugs, 1999; 36: 106-110.
19. Arthur O, Grafton DC, Alfonso R, *et al*. Remington's Pharmaceutical Sciences. Easton, Pennsylvania: Mack Publishing Company; 1980. pp. 1461-1470.
20. Bolton S. Analysis of variance. In: Pharmaceutical statistics-practical and clinical application. New York: Marcel Dekker; 1997. pp. 1123-1135.

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