Original Research Article

International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 23-10-2019; Accepted: 19-11-2019; Published: 25-11-2019
www.medicalsciencejournal.com
Volume 5; Issue 11; 2019; Page No. 310-312

An animal model to evaluate the analgesic and antipyretic activities of alcoholic extract of Justicia neesii Ramam: A clinio-pharmacological study

Dr. Rudresh
Tutor, Department of Pharmacology, Katihar Medical College, Katihar, Bihar, India

Abstract
Objective: To evaluate the analgesic and antipyretic activities of alcoholic extract of Justicia neesii Ramam.
Materials and Methods: The peripheral analgesic activity of Justicia neesii Ramam (200 and 400 mg/kg) was studied using hot-plate method in rats. The antipyretic activity was studied in Brewer's yeast-induced pyrexia.
Results: Justicia neesii Ramam significantly increased the reaction time in hot-plate test. It also showed significant antipyretic activity in Brewer's yeast-induced pyrexia in rats throughout the observation period of 3 h ($p \leq 0.05$) respectively.
Conclusion: the present study demonstrates that Justicia neesii Ramam has marked antipyretic and moderate analgesic activities.

Keywords: analgesic, Antipyretic, alcoholic, Justicia, pharmacological

Introduction
Plant parts like leaves, roots, bark are well established and most trusted medicines in India during earlier days of 1900. At that time people kept their trust on plant derived medicine and relayed largely on plants for curing every kind of diseases. In the later part of synthetic era people started working on natural products and developed many leads.
Justicia neesii is a plant belongs to family Acanthaceae, grows in tropical regions of India as a perennial herb. It is also called as Justicia micrantha Wall. Acanthaceae family is composed of nearly 2500 species of plants belongs to 250 genera. This family of plants mainly contains alkaloids, tannins, diterpenoids, cyanogenitic compounds and saponins [1].
The ethno pharmacological information suggested that the plants belongs to Justicia genera can be used for treating variety of diseases including cancer, diabetes, fever, headache, inflammation, arthritis and different gastrointestinal disorders [2].
In the previous studies on this Justicia genera reported the presence of various types of lignans. The plant was also found to contain diphyllin glycosides like Neesiinoside A and Neesiinoside B [3]. The lignan glycosides derived from Justicia ciliata showed good anti-inflammatory activities [4].
The scientific literature review showed scarcity of the data on pharmacological properties of Justicia neesii Ramam. Hence the present study was attempted to analyze the antipyretic and analgesic properties.

Materials and Methods
Study design
The present prospective clinic-pharmacological study was carried out for the period of march 2013 to Dec 2013 year in the department of Pharmacology, Katihar Medical College and Hospital, Katihar, Bihar, India. All animal experiments are conducted strictly under the guidelines of the Institutional Animal Ethics Committee. The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance.

Methodology
Collection, Identification and Extraction
Plant material was collected from different areas of the state during the month of February. The plant was taxonomically identified by the experts of Botanical Survey of India. Whole dried pulverized plant parts were extracted with ethanol using Sohxlet apparatus at a temperature of 50-55ºC for 8h. The extracts were concentrated using vacuum evaporator and the semisolid mass was dried in vacuum desiccators.

Experimental Animal
30 young adult rats weighing between 250 and 300 g, housed in rat cages with ad libitum access to a standard rodent diet and tap water. The animal room was maintained at a temperature of 23°C ± 3°C and a relative humidity of 65% ±15%.

Analgesic Activity
Eddy's hot plate method
In this method, analgesic activity was tested against thermal stimulus. The mice are placed on the copper plate, which is at a temperature of 55°C–56°C and the time between initial placement and a hand lick or a jump was taken as reaction time [5]. Mice with baseline latency more than 20 s are eliminated from the study. Mice are divided into 4 groups of 5 animals each.
Group I served as a control and received 1% Tween 80 in distilled water, 10 mL/kg (p.o.).
Group II and III served as test groups and received 200 mg/kg and 400 mg/kg (p.o.) of plant extract respectively.
Group IV received 30 mg/kg (i.p.) of standard drug pentazocine.

Antipyretic Activity
Brewer's yeast induced pyrexia in rats

In this method, rats were divided into 4 groups of 5 animals each.
Group I served as a pyretic control and received 10 mL/kg (s.c.) of 20% yeast suspension (in normal saline).
Group II and III served as test groups and received 200 mg/kg and 400 mg/kg (p.o.) of plant extract respectively.
Group IV received 100 mg/kg (p.o.) of standard drug paracetamol.
The rats will become hyperthermic, 18 h after subcutaneous injection of yeast suspension [6]. The rectal temperature was measured by using electric clinical thermometer by inserting it up to one inch.

Statistical Analysis
The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages and means. Statistical test applied for the analysis was independent sample t-test [7]. The confidence interval and p-value were set at 95% and ≤ 0.05 respectively.

Results

Table 1: Effect of Plant Extract on thermic stimulus-induced pain (Eddy's hot plate test)

Groups	Dose (mg/kg)	0 Hr	1 Hr	2 Hr	3 Hr
Group I	-	8.24 ± 1.54	8.21 ± 0.77	12.27 ± 1.11	11.84 + 1.45
Group II	200	8.38 ± 1.16	11.15 ± 1.82	15.91 ± 1.05	13.85 ± 2.06
Group III	400	8.50 ± 0.81	10.33 ± 0.73	17.66 ± 1.64*	16.94 ± 1.64*
Group IV	30	9.31 ± 1.04	16.58 ± 3.03*	18.33 ± 1.52*	14.96 ± 0.93

(N=5 rats each group). *indicates (p≤0.05) when compared to Group I

The results of hot-plate test indicated a significant increase in reaction time at 2 and 3 h with 400 mg/kg Plant extract, whereas reference drug pentazocine significantly increased the reaction time at 1 and 2 h.

Table 2: Effect of Plant Extract on Brewer's yeast-induced pyrexia

Groups	Dose (mg/kg)	0 Hr	1 Hr	2 Hr	3 Hr
Group I	-	37.71 ± 0.11	37.40 ± 0.08	37.36 ± 0.12	37.46 ± 0.13
Group II	200	37.18 ± 0.15*	37.18 ± 0.21	36.95 ± 0.26	36.97 ± 0.24
Group III	400	37.08 ± 0.15*	37.11 ± 0.07*	36.81 ± 0.11*	36.68 ± 0.08*
Group IV	100	36.48 ± 0.14*	36.00 ± 0.11*	35.93 ± 0.11*	36.03 ±0.11*

(N=5 rats each group). *indicates (p≤0.05) when compared to Group I

The experimental rats showed a mean increase of about 0.86 ^{0}C in rectal temperature, 18 h after Brewer's yeast injection. Plant extract at 200 mg/kg produced significant (P<0.05 and P<0.01, respectively) antipyretic activity at 1 h after drug administration. Whereas plant extarct (400 mg/kg) and paracetamol (100 mg/kg) showed significant antipyretic activity throughout the observation period up to 3 h

Discussion
It is well known that prostaglandins are having significant role in mediating inflammation, nociception and pyrexia. Non-steroidal anti-inflammatory drugs (NSAIDs) are the most commonly used drugs in these clinical complications, which are having evidentiary mechanisms in blocking the prostaglandin synthesis. But these drugs are associated with serious adverse effects. The results of present experiment show a parallel pharmacological relationship between the test extract and standard NSAID.
Nonsteroidal anti-inflammatory drugs (NSAIDs) inhibit the enzyme cyclooxygenase at peripheral tissues and block the release of endogenous substances that exerts pain. The antagonism of prostaglandin receptors or suppression of the formation of the prostaglandins may be the possible reason for analgesic effects of plant extract against writhing. From these screenings we observed that effective dose of test compound is varying based on experimental method adopted for evaluation.
The analgesic activity of plant extract against acute inflammatory pain was moderate as compared to potent inhibitory activity of NSAIDs offer relief from inflammatory pain by suppressing the formation of pain substances in the peripheral tissues, where prostaglandins and bradykinin were suggested to play an important role in the pain process [8]. Therefore, it is likely that plant extract might suppress the formation of these substances or antagonize the action of these substances and thus exerts its analgesic activity. In the present study, plant extract (400 mg/kg) significantly increased the reaction time in hot-plate test, suggesting its effective analgesic activity.
The antipyretic effects of NSAIDs will be produced through inhibition of prostaglandin synthetase in hypothalamus [9]. Antipyretic drugs decrease the levels of PGE_2 particularly in the hypothalamus region by acting on COX-2. They also mediate their effects by increasing the production of vasopressin and arginine [10].
The antipyretic nature of the plant extract may be through the inhibition of prostaglandin formation particularly at anterior hypothalamic region. The experimental results seem to suggest that the analgesic activity of plant extract was more than the antipyretic activity, as it suppresses the pain even at low concentrations.

Conclusion
The present study demonstrates that Justicia neesii Ramam has marked antipyretic and moderate analgesic activities. However, the precise phytochemicals conscientious for these effects of Justicia neesii Ramam have to be acknowledged and auxiliary pharmacological studies may be taken up in developing lead compounds.

References
1. WC Evans, WB Saunders. Editors. Trease and Evans

Pharmacognosy. 15th ed. London: Cambridge University Press, 2002, p. 35.
2. Geone M Correa, Antonio F de C Alcantara. Chemical constituents and biological activities of species of Justicia - a review. Brazilian Journal of Pharmacognosy. 2012; 22(1):220-38.
3. Gottumukkala V, Subbaraju Dodda, Rajasekhar Jakka, Kavitha Jorge, Jimenez I. Justicia lignans: Part 7-Two new diphyllin glycosides from Justicia neesii ramamoorthy. Indian Journal of Chemistry. 2001; 40B:313-19.
4. Day SH, Chiu NY, Tsao LT, Wang JP, Lin CN. New lignan glycosides with potent anti-inflammatory effect, isolated from Justicia ciliate. J Nat Prod. 2000; 63:1560-62.
5. Eddy NB, Leimbach D. Synthetic analgesics. II. Dithienylbutenyl- and dithienylbutylamines. J Pharmacol Exp Ther. 1953; 107:385-93.
6. Loux JJ, DePalma PD, Yankell SL. Antipyretic testing of aspirin in rats. Toxicol Appl Pharmacol. 1972; 22:672-5.
7. Snedecor GW, Cochran WG. editors. Statistical Methods. New Delhi, IBH Publishing Company, 1979.
8. Hirose K, Jyoyama H, Kojima Y, Eigyo M, Hatakeyama H, *et al*. Pharmacological properties of 2-[44-(2-triazolyloxy)-phenyl [propionic acid (480156-5)], a new non-steroidal anti-inflammatory agent. Arzeim Forsch/Drug Research. 1984; 34:280-6.
9. Clark WG, Cumby HR. The antipyretic effect of indomethacin. J Physiol. 1975; 248:625-38.
10. Chandrasekharan NV, Dai H, Roos KL, Evanson NK, Tomsik J, Elton TS, *et al*. COX-3, a cyclooxygenase-1 variant inhibited by acetaminophen and other analgesic/antipyretic drugs: Cloning, structure, and expression. Proc Natl Acad Sci U S A. 2002; 99:13926-31.