Journal of Ayurvedic and Herbal Medicine

Research Article

ISSN: 2454-5023
J. Ayu. Herb. Med.
2017; 3(2): 60-62
April- June

www.ayurvedjournal.com
Received: 22-04-2017
Accepted: 19-06-2017

Antipyretic activity of methanolic leaf extract of *Canarium strictum* Roxb.

Venkatachalapathi A[1], H. Abdul Kaffoor[1], S. Paulsamy[1]

1 *Department of Botany, Kongunadu Arts and Science College, Coimbatore, Tamil Nadu-641029, India*

ABSTRACT

The present study is aimed to investigate the antipyretic activity of methanolic leaf extract of *Canarium strictum* in wistar albino mice. Pyrexia was induced in mice by Brewer's yeast suspension. The animals were divided in to 5 groups, 6 of each as following Group I received normal saline water (control); Group II received standard paracetamol 150 mg/kg; Group III, IV & V received methanolic leaf extract of *C. strictum* at doses 100, 200 & 300 mg/kg respectively. In all experiments, rats were orally administered. The temperature of all the mice in each group was measured at the start of study, at 18 h after yeast injection and every hourly for 4 h thereafter. The mean temperature was found out for each group and was compared with the control group and standard drug group. The *C. strictum* leaf extract at doses 200 and 300 mg/kg significantly reduced the body temperature on yeast induced pyrexia and was comparable with standard.

Keywords: *Canarium strictum*, Brewer's yeast, Paracetamol, Pyrexia.

INTRODUCTION

Fever is one of the most important and common presenting symptom in pediatric clinics, outpatient departments and emergency. Chandra and Bhatnagarr [1] reported the fever may be defined as a complex physiologic response to a disease, mediated by pyrogenic cytokines and characterized by a rise in core temperature, generation of acute phase reactants and activation of immune systems [2,3]. Regulation of body temperature requires a delicate balance between production and loss of heat, the hypothalamus regulates the set-point at which the body temperature is maintained. Alexander *et al.* [4] reported the fever this hypothalamus thermostat set point is elevated and body temperature increases over normal values. The normal range of body temperature is 36.5°C- 37.5°C.

Pyrexia or fever is caused as a secondary impact of infection, malignancy or other diseased states. It is the body's natural defense to create an environment where infectious agent or damaged tissue cannot survive [5]. Normally the infected or damaged tissue initiates the enhanced formation of proinflammatory mediator's (Cytokines like interleukin 1β, α, β and TNF- α), which increase the synthesis of prostaglandin E2 (PGE2) near peptic hypothalamus area and thereby triggering the hypothalamus to elevate the body temperature [6]. As the temperature regulatory system is governed by a nervous feedback mechanism, so when body temperature becomes very high, it dilate the blood vessels and increasing sweating to reduce the temperature; but when the body temperature become very low hypothalamus protect the internal temperature by vasoconstriction. Veugelers *et al.* [7] reported that high fever often increases faster disease progression by increasing tissue catabolism, dehydration and existing complaints, as found in HIV. Drugs having antiinflammatory activity generally possess antipyretic activity (e.g) non-steroidal anti-inflammatory drugs (NSAIDs). It has been suggested that prostaglandin (PGE) mediates pyrogen fever; the ability of NSAIDs, to inhibit prostaglandin synthesis could help to explain their antipyretic activity.

Search for safe herbal remedies with potent antipyretic activity received momentum recently as the available antipyretics, such as paracetamol, aspirin, nimusulide etc, which have toxic effect to the various organs of the body [8]. The subacute toxicity results revealed that *Canarium strictum* might be considered as a broad non-toxic one. The antipyretic activity exhibited that the methanol extract of leaves possess a significant antipyretic effect in maintaining normal body temperature and reduced the elevated rectal temperature in rats and their effects are comparable to that of standard antipyretic drug paracetamol. Such reduction of rectal temperature of the tested animals appears to be due to the presence of a single bioactive substance or a mixture of compounds in them. Therefore, the present study aimed to evaluate the analgesic effect of methanolic leaf extract of *C. strictum*.

***Corresponding author:**
Dr. A. Venkatachalapathi
Department of Botany, Kongunadu Arts and Science College, Coimbatore, Tamil Nadu-641029, India
Email:
avenkatachalapathi61[at]gmail.com

MATERIALS AND METHODS

Collection and Extraction

Fresh leaves of *Canarium strictum* an endangered tree were collected in Walayar valley, southern Western Ghats of Tamil Nadu, India. Plant material was dried under shade at room temperature, pulverized by a mechanical grinder, sieved through 40 meshes. The powdered material (100 g) was extracted with 95% methanol by hot continuous Percolation method in a Soxhlet apparatus. The extract was then concentrated and dried under reduced pressure. The methanol free semi solid mass obtained (13.65 g) and suspended in 5% gum *Acacia* for pharmacological studies.

Animals.

Swiss albino mice of both sexes weighing between (18-25 g) were used for the experiment. The animals were kept in clean and dry plastic cages, with 12h: 12h light dark cycle at 25°C temperature and 45-55% relative humidity. The animals were fed with standard pellet diet and water was given ad libitum. This study was carried out in the animal house of Kongunadu Arts and Science College, Coimbatore-29, (vide. no. 659/02/a/CPCSEA).

Antipyretic activity

The antipyretic activity on albino mice was studied with fever induced by 20% Brewer's yeast. After measuring rectal temperature of the mice by introducing 1.5 cm of digital thermometer in rectum, pyrexia was induced by injecting subcutaneously, 20% suspension of dried yeast in 2% gum Acacia in normal saline at a dose of 20 ml/kg of body weight. After 18 hour of yeast injection, mice which showed a rise in temperature of at least 1°C were taken for the study. Animals in the various groups were treated as follows:

The animals were divided in to 5 groups, of 6 rats each. The experimental protocol was as follows:

Group I: Normal saline water (control)

Group II: Paracetamol (reference standard) (150 mg/kg).

Group III: Methanolic leaf extract of *Canarium strictum* (100 mg/kg).

Group IV: Methanolic leaf extract of *C. strictum* (200 mg/kg).

Group V: Methanolic leaf extract of *C. strictum* (300 mg/kg).

In all groups, mice were orally administered. After oral administration, the temperature was measured at 1h, 2h, 3h and 4h for all the mice in each group. The mean temperature was found out for each group and was compared with the standard drug.

RESULTS AND DISCUSSION

The experimental animals showed a marked increase in rectal temperature after 18 hours of Brewer's yeast injection. The Group IV & V showed decrease in rectal temperature when compared to control group ($P<0.05$) after 1h. The decrease in temperature is statistically significant and is comparable with that of standard group (Table 1). In the present study, the antipyretic activity of methanolic leaf extract of *C. strictum* in mice was evaluated. The methanolic leaf extract of *C. strictum* significantly reduced the yeast induced elevated body temperature in a dose dependent manner and its effect is comparable to that of the standard antipyretic drug, Paracetamol.

Table 1: Effect of methanolic leaf extract of *Canarium strictum* on Brewer's yeast induced Pyrexia in Wistar albino mice.

S No	Groups	Dose	Normal Temperature (°C)	Rectal Temperature (°C) 18 hrs after yeast induced pyrexia	Rectal temperature (°C) after treatment with extract			
					1h	2h	3h	4h
1.	Group I	-	98.58±0.36	99.61±0.43	99.86±0.36	100.10±0.25	100.62±0.73	100.82±0.12
2.	Group II	150 mg/kg	98.46±0.41	99.54±0.47	99.30±0.87	98.76±0.33*	98.12±0.38**	97.60±0.15**
3.	Group III	100 mg/kg	98.65±0.43	99.60±0.63	99.52±0.43	99.24±0.37	99.16±0.62	98.86±0.28*
4.	Group IV	200 mg/kg	98.68±0.64	99.72±0.45	99.58±0.35	99.06±0.68	98.61±0.11*	98.31±0.58*
5.	Group V	300 mg/kg	98.58±0.41	99.91±0.36	99.42±0.66	98.81±0.18*	98.26±0.72**	97.75±0.21**

Each value represents mean ± SEM, n=6, * P<0.05, **P<0.001 as compared to control values.

Yeast induced fever is a model for pathogenic fever. Yeast induced fever is due to the release of inflammatory mediators like cytokines- IL-1, IL-6, TNF etc., Within the hypothalamus PGE2 produced by cyclooxygenase (COX-2) is regarded as principle downstream mediator of fever [9]. Most of the non-steroidal anti-inflammatory drugs produce their antipyretic action through the inhibition of prostaglandin synthetase within the hypothalamus. So the possible mechanism for the antipyretic activity of methanolic leaf extract of *C. strictum* is due to the inhibition of prostaglandin synthesis [10]. The phytochemical studies have demonstrated that alkaloids, flavonoids, alkaloids, sterols etc. are the active principles in methanolic leaf extract of *C. strictum*. From the earlier studies it has been reported that flavonoids, alkaloids and sterols have antipyretic action. All these chemical constituents may be responsible for antipyretic activity of *C. strictum* [8,11-13].

The methanolic, butanolic and petroleum ether extracts of dried leaves of *Pergularia extensa* showed significant antipyretic activity in rats is due to the presence of the phytoconstituents flavanoids, steroids and saponins [14]. Presences of flavonoids were reported in *Dalbergia* species and flavonoids are known to inhibit prostaglandin synthetase. Therefore it appears that antipyretic action of *Dalbergia* species may be related to the inhibition of prostaglandin synthesis in hypothalamus [10]. The antipyretic properties of *Acacia catechu* may be ascribed to the presence of flavonoids [15]. As some flavonoids are predominant inhibitors of cyclooxygenase or lipooxygenase [16,17].

Chloroform extract of the *Solanum nigrum* leaves exhibited antipyretic activity when assessed against Brewer's yeast induced pyrexia test is due to the presence of phyto constituents like steroidal glycosides and steroidal oligoglycosides [18]. *Myrica salicifolia* root extract was found to have analgesic and antipyretic activity in mice. The phytoconstituents responsible for these activity is a variety of flavonoids among which myricitrin is generally considered [19].

CONCLUSION

In conclusion, methanolic leaf extract of *C. strictum* is having antipyretic activity. The underlying mechanism may be inhibition of prostaglandin synthesis within the hypothalamus. The active constituents such as alkaloids, flavonoids and sterols of methanolic leaf extract of *C. strictum* may be responsible for this antipyretic activity. Further studies at molecular levels are required to establish the exact mechanism of action.

Source of support – Nil.

Conflict of interest – None declared.

REFERENCES

1. Chandra J, Bhatnagarr SK. Antipyretics in Children. Indian J. Paediatr. 2002;69(1):69-74.
2. Avtar L. Antipyretic Effects of Nimesulide, Paracetamol and Ibuprofen-Paracetamol. Indian J. Paediatr. 2000;67(12):865.
3. Begum TN, Hussain M, Ilyas M, Anand AV. Antipyretic activity of *Azima tetracantha* in experimental animals. J. Cur. Biom. Pharm. Res. 2011;1(2):41–44.
4. Alexander KC. Fever in childhood. Canadian Family Physician. 1992;38:1832-36.
5. Chattopadhyay D, Arunachalam G, Ghosh L, Rajendran AB, Bhattacharya SK. Antipyretic activity of *Alstonia macrophylla* Wall exA. DC: An ethnomedicine of Andaman Islands. J. Pharm. Pharm. Sci. 2005;8:558-64.
6. Spacer CB, Breder CD. The neurologic basic of fever. New England J. Med. 1994;330:1880-86.
7. Veugelers PJ, Kaldor JM, Strathdee SA, Page-Shafer KA, Schechter MT, Coutinho RA *et al*. Incidence and prognostic significance of symptomatic primary human immuno deficiency virus type Infection in homosexual men. J. Infect. Dis. 1997;176:112-17.
8. Guyton AC, Hall JE. Textbook of Medical physiology. 9th (ed.). W.B. Saunders company, Philadelphia. p. 1998. 920-22.
9. Ramaswamy S, Pillai NP, Gopalkrishnan V, Parmar NS, Ghosh MN. Analgesic effect of O (Beta hydroxyethyl) rutoside in mice. Indian J. Exp. Biol. 1985;23:219-20.
10. Hajare SW, Chandra SKS, Tandan J, Sarma J, Lal AG. Analgesic and antipyretic activities of *Dalbergia sissoo* leaves. Indian J. Pharmacol. 2000;32:357-60.
11. Loux JJ, Depalma PD, Yankell SL. Antipyretic testing of aspirin in rats. Toxicol. Appl. Pharmacol. 1972;22:672-75.
12. Kinsella JE, Lokesh B, Broughton S. Dietary polyunsaturated fatty acid and eicosanoids; Potential effects on the modulation of inflammatory and immuned cells: an overview. Nutrition. 1990;6:24-44.
13. Gupta MB, Nath R, Srivastava N. Anti-inflammatory and antipyretic activities of beta sitosterol. Internat. Immunopharmacol. 1996;18:693-700.
14. Jalapure SS, Habbu PV, Patil MB, Kulkani RV, Simpi CC, Patil CC. Analgesic and antipyretic activity of *Pergularia extensa* in rats. Indian J. Pharm. Sci. 2002;64(5):493-95.
15. Ray D, Sharatchandra KH, Thokchom IS. Antipyretic, antidiarrhoeal, hypoglycaemic and hepatoprotective activities of ethyl acetate extract of *Acacia catechu* willd in albino rats. Indian J. Pharmacol. 2006;38(6):408-13.
16. Mathew AG, Parpia HAB. Food browning as a polyphenol reaction. In: Chichester CO, Mark EM, Stewart GF, editors. Advances in food research New York: Academic Press. pp. 1971. 75-145.
17. Rajnarayana K, Reddy MS, Chaluvadi MR, Krishna DR. Bioflavonoids classification,pharmacological, biochemical effects and therapeutic potential. Indian J. Pharmacol. 2001;33:2-16.
18. Amiruddin Z, Gopalan HK, Zainal H, Mohd Pojan NH, Morsid NA, Aris A *et al.* Antinociceptive, anti-inflammatory and antipyretic effects of *Solanum nigrum* choloroform extract in animal models. Pharmaceutical Society of Japan. 2006;126(11):1171-78.
19. Njunge K, Muriuki G, Mwangi JW, Kuria KA. Analgesic and antipyretic effects of *Myrica salicifolia* (Myricaceae). Phytother. Res. 2002;16(1):73-74.

HOW TO CITE THIS ARTICLE
Venkatachalapathi A, H. Abdul Kaffoor, S. Paulsamy. Antipyretic activity of methanolic leaf extract of *Canarium strictum* Roxb. J Ayu Herb Med 2017;3(2):60-62.