Original Article

Evaluation Of Antipyretic Activity Using Cinnamomum Zeylanicum Aqueous Extract In Albino Wistar Rats

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DOI:10.47750/pnr.2022.13.S08.675

Abstract

The *Cinnamomum zeylanicum* derived components like cinnamaldehyde, or sodium cinnamate produces the hypothermic and antipyretic effects. Antipyretic activity is an activity in which the body temperature increases and that tends to the various kinds of problems and illnesses in the body. The antipyretic are the agents that help to reduce the extra body temperature which affects the creature. In our study we evaluated the antipyretic activity of *Cinnamomum zeylanicum* on Albino Wistar rats by extracting the *Cinnamomum zeylanicum* component using a Soxhlet apparatus and was freeze-dried to obtain crude water extract yield of 8.3% w/w. This freeze-dried extract was used in different dosage after making a stock solution of 40mg/ml in experimental albino Wistar rats and Swiss albino mice. The doses of aqueous extracts of *Cinnamomum zeylanicum* to be used in the study will be calculated based on previously documented LD_{50} on rats as per OECD guidelines (OECD_423). Through brewer's yeast induced pyrexia method the total 36 Albino Wistar rats were procured for the study and divided into six groups, each group comprising six rats. It was seen that aqueous extract of *Cinnamomum zeylanicum* at the given dose of 400 mg/kg & 200mg/kg PO significantly ($p<0.0001$) reduced the rectal temperature of rats induced by brewer's yeast injection at 60 minutes, 90 minutes, and 120 minutes. Therefore, in our study we found that the antipyretic effect of aqueous extract of both test drugs might be due to the inhibition of cyclo-oxygenase enzyme.

Keywords: Antipyretic activity, Albino Wistar rats, Cyclo-oxygenase enzyme, *Cinnamomum zeylanicum*.

1. INTRODUCTION

Cinnamomum zeylanicum is the Lauraceae family includes the evergreen tree of tropical medicine. Cinnamon is mostly composed of essential oils and various derivatives such as cinnamaldehyde, cinnamic acid, and cinnamate [1]. In the wild, the tree grows to a height of 7-10 metres and has highly veined ovate leaves that are dark green underside. Both the bark and the leaves are scented. Cinnamomum zeylanicum derived components such as cinnamaldehyde and sodium cinnamate exert hypothermic and antipyretic effects [2]. The most important elements of cinnamon are cinnamaldehyde and trans-cinnamaldehyde, which are contained in the essential oil and contribute to the smell as well as the numerous biological activity seen with cinnamon [3]. It also has Antipyretic and analgesic activities due to cinnamaldehyde and sodium cinnamate produces hypothermia and antipyretic effect.

Antipyretic activity is an activity in which the body temperature increases and that tends to the various kinds of problems and illnesses in the body. Antipyretics are the agents that help to reduce the extra body temperature which affects the creature. The agents also help in reducing the fever in the body and make the body free of illness [3]. Pyrexia is defined as a rise in body temperature between 37.22°C and 40.57°C, whereas hyperpyrexia is defined as an increase in body temperature over 41.66°C. The body's temperature rises due to a malfunction in the warmth-regulating system. Toxins (pyrogens) operate on white blood cells, causing endogenous pyrogen to be produced [4]. This has an immediate effect on the anterior hypothalamus, raising the body temperature. Fever can occur for a variety of causes, including infections (e.g., typhoid fever, pneumonia,etc.), injury to dehydration, frightened centers tissue destruction, management of a some medications, and so on [5]. Puerperal fever is defined as the presence of a heat in a mother that is more than or equal to 38°C within the first 14 days after parturition. There are several explanations for such warmth, but before to antibiotics, it was a signal that was very much feared since it had a completely dismal prognosis. The ultimate results are significantly superior the days with cure and set off repute of the underlying reason [6]. The main elements in the antipyretic agents are Choline salicylate or the anthro pan, Magnesium salicylate or Arthritis, Aspirin, and Sodium salicylate [7]. Cinnamon is one of the most significant spices used by people all over the world on a regular basis. Cinnamon has different properties like anti-inflammatory, antioxidant, anticancer, anti-diabetic, antibacterial, cardiovascular-disease-lowering chemical,

and lipid-lowering [8]. Cinnamon has significant anti-inflammatory activities in macrophage cell lines by suppressing the synthesis of nitric oxide (NO), COX-2, and prostaglandin (PG) E2. Cinnamaldehyde (CNA) inhibits proliferation of several human cancer cell lines, including breast, leukemia, ovarian, and lung tumour cells, by modulating inflammatory nuclear factor kappa-light-chain-enhancer of activated B cells (NF-kB) activation via the redox-related NF-kB inducing/inhibitor kinase (NIK/IKK) and mitogen-activated protein kinase [9, 10]. There are some researches which shows the prevention of neurological illnesses such as Alzheimer's and Parkinson's [11]. It also used in the essence and aroma industries, and its components can be found in a range of perfumes, foods, and medicinal products. Cinnamon bark contains procyanidins and catechins and beneficial for natural extract that aids in the maintenance of the respiratory system, gynaecological ailments, and digestive system[4].

In this study we investigate the anti-pyretic activity of cinnamon extract from Cinnamomum cassia L. family lauraceae on Albino Wistar rats specifically focusing on the anti-inflammatory properties.

2. MATERIAL AND METHODOLOGY

2.1. Materials

2.1.1. Experimental Rodents

The prospective randomised experimental investigation was carried out at Meerut's L.L.R.M. Medical College's Department of Pharmacology. The study was approved by the Institutional Animal Ethical Committee of Lala Lajpat Rai Memorial Medical College, Meerut, India, which is registered with CPCSEA India (Registration No.819 / 04/ ac/ CPCSEA).

Adult albino rats of both sexes, weighing 150-200gm, will be obtained from the Institute's Central Animal House's rat raising section. The animals will be kept in typical laboratory settings with 12-hour intervals of light and darkness and temperature regulation (25 $\pm$2^{o}c). The rats will have unlimited access to a conventional rat pellet meal as well as tap water. The study will exclude pregnant female rats.

The doses of aqueous extracts of *Cinnamomum zeylanicum* to be used in the study will be calculated based on previously documented LD_{50} on rats as per OECD guidelines (OECD_423).

2.1.2. Preparation of extract:

Cinnamomum zeylanicum: The barks of *Cinnamomum zeylanicum* were purchased from India mart and dried in a drying oven at 60 ^{o}C and finely grinded in the powder form through mechanical mixer. The 5 g of the dried plant material of *Cinnamomum zeylanicum* were refluxed with 150ml of water in around bottom flask fitted with a condenser on a heating mantle at set temperature 100^{0}C for 5-6 hrs. From this powder, using Soxhlet apparatus the *Cinnamomum zeylanicum* component was extracted in distilled water and the resulting hot water extract was freeze-dried to obtain crude water extract yield of 8.3% w/w. This freeze-dried extract was used in different dosage after making a stock solution of 40mg/ml in experimental albino Wistar rats and Swiss albino mice[12].

2.2. Methodology

2.2.1. Brewer's yeast induced pyrexia method

We used 2ml Brewer's Yeast of 15% suspension in 2% gum acacia in normal saline was injected subcutaneously on the back of rats to induce pyrexia and the rectal temperature was noted after 20hrs of administration of inducing agent brewer's yeast and then after treatment with different drugs at 30 minutes intervals for 2 hrs in the following groups [13]:
Total 36 Albino Wistar rats were procured for the study and sub-divided into six groups, each group comprising six rats.

Group I- The experimental animals of this group (Control group) were given 0.9% NaCI solution in an oral dose of 2ml/100gm b.w. for 21 days.

Group II - In addition to a pellet nourishment and tap water, the experimental animals in this group were given Paracetamol in a single oral dose of 150mg/kg body weight [14] on day 21st.

Groups III - This group was given an aqueous extract of *Cinnamomum zeylanicum [AECZ]* per orally in 200mg/kg dose consecutively for 21 days.

Groups IV - This group was given an aqueous extract of *Cinnamomum zeylanicum [AECZ]* per orally in 400mg/kg dose consecutively for 21 days.

On day 21st the experiment was carried out and the temperature of all groups was noted after a regular interval of 30 mins for 2 hours.

2.2.2. Statistical analysis

Data are expressed as the Mean ±S.E.M. Analysis of variance (ANOVA) was applied for the analysis of results. Results were considered significant at $p<0.05$.

3. RESULTS

The results were obtained with the reference drug Paracetamol (150 mg/kg p.o and *AECZ* (200 and 400 mg/kg, PO) are presented in Table 1 and fig 1. The minimum increase in rectal temperature of Wistar rats, 20 hours after brewer's yeast injection minimum temperature (101.7±0.5) was seen in group III and the maximum increase in temperature (102.3±0.6) was seen in group IV. Paracetamol in a dose of 150 mg/kg, PO significantly decreased the rectal temperature to normal baseline temperature after 90 minutes after administration. Aqueous extract of *Cinnamomum zeylanicum* at the given dose of 400 mg/kg & 200mg/kg PO significantly ($p<0.0001$) reduced the rectal temperature of rats induced by brewer's yeast injection at 60 minutes, 90 minutes and 120 minutes as shown in table no 1 and Fig 1.

3.1. Antipyretic study

Table 1: Effect of Paracetamol, *Cinnamomum zeylanicum* on Brewer's yeast induced pyrexia in albino rats (n=6).

Drug	Dose (mg/kg, oral)	Rectal temperature °C±SEM					
		Before yeast injection	Pyretic (20 hrs after brewer's yeast injection)	30 min after drug administration	60 min after drug administration	90 min after drug administration	120 min after drug administration
Normal saline	2ml/100g	97.8±0.8	102.4±0.4	102.15±0.3	102.2±0.3	102.2±0.2	102.2±0.2
Paracetamol	150	97.7±0.8	102.4±0.6	101.9167±0.5	100.2±1.2	98.4±0.5	97.7±0.5
AECZ200	200	97.8±0.6	101.7±0.5	101.6±0.5	100.9±0.8	99.2±0.8	97.8±0.7****
AECZ400	400	97.9±0.2	102.3±0.6	102.2±0.6	99.6±0.6	97.5±0.2	97.4±0.4***

Values are presented as mean ± S.E.M

***p<0.0001, significant in comparison to control

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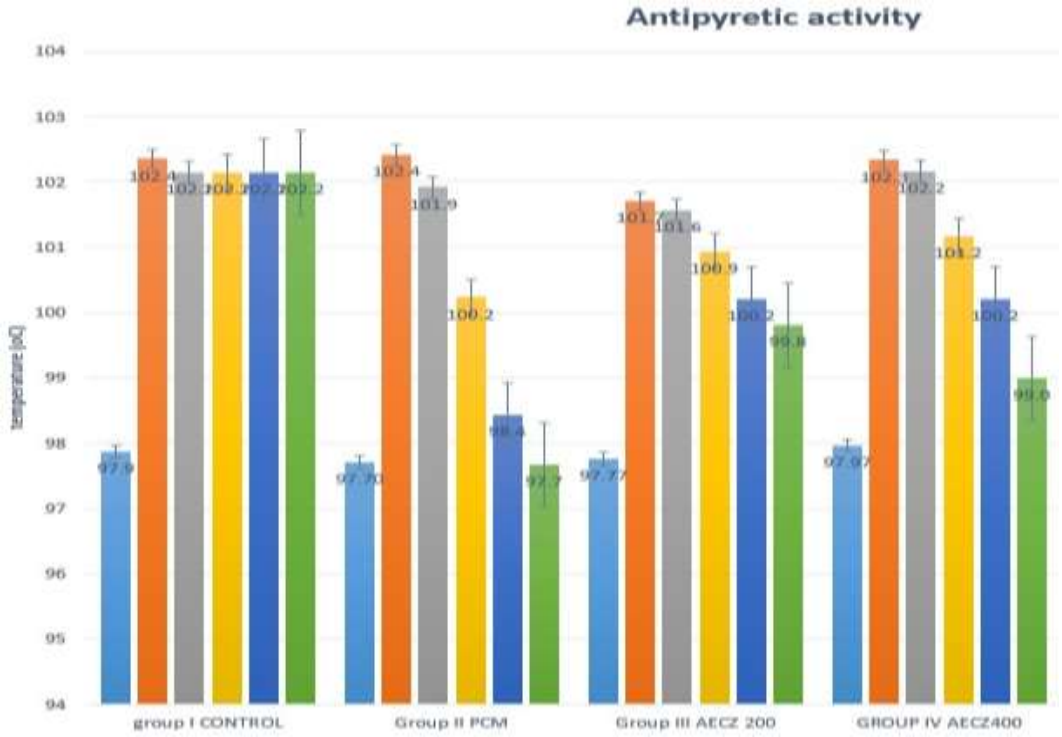

Figure 1: Antipyretic activity between group.

4. DISCUSSION

"Plants provide oxygen to our planet and all other living things." They are referred to as "mothers of medicine." Plants provide care for all humans and animals in the same way that mothers do for their children. Medicinal plants contain medicinal characteristics that have a pharmacologically helpful effect on both the animal and human bodies."

The herbal plants *Cinnamomum zeylanicum* was claimed to have antipyretic activities however the clinical research to support these claims are few. Therefore, a pharmacological approach with emphasis on exploring its antipyretic properties became undertaken.

AECZ in the doses of 200 and 400 mg/kg possess antipyretic activity against yeast induced pyrexia in rats (Table 1 and Fig 1) and reduces the temperature significantly. The standard drug paracetamol reduced the temperature to base line within 90 minutes. AECZ showed decreased temperature gradually in rats and touch the base line after 120 minutes. Because of the low amounts of active phytochemical components in the extract, many of the bioactive chemicals in AECZ

may have been swiftly metabolised and excreted. According to the findings of this study (table 1), the AETT dramatically lowered rectal temperature when compared to the reference medication.

Furthermore, the extract may have lowered PGE2 concentrations in the hypothalamus by its influence on the cyclooxygenase enzyme or by increasing the body's natural antipyretic chemicals such as vasopressin, IL 10, and arginine [15].

Cyclo-oxygenase enzyme inhibition is reported to be responsible for antipyretic activity of the reference drug paracetamol[16]. Therefore, the aqueous extract shows the anti-inflammatory effects and which ultimately increasing the antipyretic activity in the human body during fever.

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