

*Research Article*

**Analgesic Activity of Hydroalcoholic Extract of *Cinnamomum zeylanicum* Bark in Albino Rats.**

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**ABSTRACT**

Toxicity study and phytochemical analysis of hydroalcoholic extract of *Cinnamomum zeylanicum* bark were carried out by using standard methods. Then the extract was administered orally at a dose of 100, 200 and 400 mg/kg to evaluate the analgesic effect by using Tail immersion and Hot plate method in swiss albino rats. Hydroalcoholic extract of *Cinnamomum zeylanicum* bark showed no toxicity up to 1000 mg/kg body weight and the phytochemical study indicates presence of carbohydrates, terpenoids, tannins, saponins, flavonoids, glycosides and steroids. The extract showed significant analgesic activity at a dose dependent manner in tail immersion method but in hot plate method, it showed significant activity in 100 and 400 mg/kg body weight. The hydroalcoholic extract of *Cinnamomum zeylanicum* bark shows analgesic activity in albino rats and was comparable with pentazocin.

**KEYWORDS**

*Cinnamomum zeylanicum*, Analgesic activity, Tail Immersion Method, Hot Plate Method.

## 1. INTRODUCTION

Analgesics most commonly known as painkillers are used to reduce the feeling of pain without loss of consciousness. According to WHO, traditional medicines has established and proved to have preventive, curative and rehabilitative roles. Many herbals are used in various traditional system of medicine like Ayurveda, Siddha, Unani, Homeopathic and Allopathic for the treatment of different disease. The word Cinnamon comes from the Greek word Kinnamon<sup>1</sup> which is a very good spice cultivated in tropical area like Sri Lanka and South east of India. It obtained from dried inner bark of the tree *Cinnamomum zeylanicum* belongs to the family Laureaceae. It is also called Ceylon cinnamon or True cinnamon, which has two main varieties; *Cinnamomum zeylanicum* (CZ) and *Cinnamon cassia* (CC) (also known as *Cinnamomum aromaticum*/ Chinese cinnamon). The bark of cinnamon mainly contains essential oil, cinnamaldehyde, eugenol, camphene, cinnamyl acetate and cinnamyl alcohol, which is the main active phytoconstituents of this drug<sup>2</sup>. It shows number of pharmacological effect has like anti-inflammatory, anti-oxidant, anti-microbial, anti diabetic, and memory enhancing activity<sup>1</sup>. In ayurvedic system of medicines it is used in preparations like flue preventive, indigestion, flatulence, mouth washes and as per the unani system, the bark is used for gastroenterological problems<sup>2</sup>. Hence, the present study was undertaken to investigate the analgesic activity of hydroalcoholic extract of *Cinnamomum zeylanicum* bark in swiss albino rats by using tail immersion and hot plate method.

## 2. MATERIALS AND METHODS

The dried barks of *Cinnamomum zeylanicum* were collected from the outskirts of Berhampur, Odisha on 2<sup>nd</sup> June, 2015. Then it was coarsely powdered using hand grinding machine and was passed through sieve no 60 and stored in air tight containers.

### 2.1. Preparation of hydro alcoholic extract

At about 100 g of bark powder was taken in a beaker and macerated with 50 ml of solvent containing methanol and water at a ratio of 1:1 for 24 hour. Then in the next day the macerated powder of the bark was extracted using soxhlet apparatus with 250 ml of solvent containing water and methanol (1:1), maintained at a temperature of 60°C. The extraction was continued for 4-6 hr until color faded of the powder and the extract was evaporating to dryness under water bath. The dried exact was stored in a decicator till further use.

### 2.2. Animals

Swiss albino rats weighing 120-140 g of either sex were maintained under controlled condition of light (12 hr) and temperature 25±1°C in the animal house of Roland Institute of Pharmaceutical Sciences, Berhampur. The animals were acclimatized for one week prior to actual experiment. All the Pharmacological activities were carried out as per CPCSEA norms, after obtaining the approval from the Institutional Animal Ethical Committee of Roland Institute of Pharmaceutical Sciences, Berhampur.

### 2.3. Acute Toxicity Test

Acute oral toxicity study was carried out as per OECD guide line 423. Animals of both the sexes were selected by random sampling technique for the study. A single dose of hydroalcoholic extract of *Cinnamomum zeylanicum* (HAECZ) bark starting at a dose of 200 mg/kg and progressively moving from 400, 600, 800 mg/kg and up to 1000 mg/kg body weight was administered. All animals were closely observed for the toxic symptoms like behavioral changes, locomotion, muscle spasm, loss of righting reflex, tremor, convulsion and mortality for 24 hr and further supervised for a period of 14 days for occurrence of toxic symptoms and mortality<sup>3</sup>.

#### *2.4. Analgesic Activity Study Methods*

##### *2.4.1. Tail Immersion Method*

The experiment was carried out by measuring tail withdrawal time from hot water<sup>4</sup>. Rats were randomly divided into five groups containing six animals each (n=6), food was withdrawn for 12 hours but not with water. After 12 hrs group-I received distill water p.o., group-II was given pentazocin 20mg/kg, i.p., group-III, IV and V were given 100, 200 and 400mg/kg of HAECZ respectively, p.o. After 30 min of pentazocin administration and 1hr of extract administration, about 3-5cm of the tail of each rat was dipped into a water bath containing warm water maintained at the temperature of 50±10°C and the time taken for the rat to flick the tail known as the pain reaction time (PRT) was recorded for all the rats.

##### *2.4.2. Hot Plate Method*

The study was performed using the effect of hot plate induced pain in rat<sup>5, 6</sup>. Adult rats of either sex were randomly divided into five groups containing six animals per group (n=6). Food was withdrawn for 12 hours but not with drinking water. The pre drug PRT was assessed by placing each rat upon a heated metal plate (Hot plate) maintained at a temperature of about 55±1°C within a restraining cylinder. The PRT for each rat was determined using a stop watch to measure the time it took to flick or lick the hind paw or jump. The cut off time was put at 20 seconds, this served as control reaction time. After the basal reaction time Group-I received distill water, p.o., group-II was given pentazocin 20mg/kg, i.p and group III, IV and V was given 100, 200 and 400mg/kg of HAECZ bark respectively. The PRT for each rat was again determined using the same method as above.

### **3. RESULTS AND DISCUSSION**

#### *3.1. Toxicity Evaluation*

The HAECZ did not show any mortality up to 1000 mg/kg. There was no change in behavior, locomotion, muscle spasm, loss of righting reflex, tremor and convulsion was observed in 24 hours. Further no mortality was observed after 14 days.

#### *3.2. Preliminary Phytochemical Evaluation*

The phytochemical test of HAECZ bark contents various phytoconstituents is shown in Table 1.

#### *3.3. Analgesic Activity*

##### *a. Tail Immersion response in albino rats*

Analgesic activity was investigated by tail immersion method. The reaction time was taken as the parameter for the evaluation of analgesic activity. There was no significant difference in reaction time was observed in control group at different time interval, as well as the treated groups compared with control group at basal point. Pentazocin at a dose of 20 mg/kg showed significant difference ( $p < 0.01$ ) compared to control group at 15, 30 and 60 min respectively (Table-2). The HAECZ at a dose of 200 and 400 mg/kg shows significant difference ( $p < 0.05$ ) and ( $p < 0.01$ ) respectively at 30 min time interval compared to control group. Whereas at 60 min the extract at a dose of 200 and 400 mg/kg body weight showed significant difference ( $p < 0.01$ ) compared to control group (Table-2). Hence we found that HAECZ bark have significant analgesic activity which is shown in Table-2 and fig.1.

*b. Hot plate response in albino rats*

Analgesic activity was investigated by hot plate method. The reaction time was taken as the parameter for the evaluation of analgesic activity. There was no significant difference has been observed in reaction time of the control group at different time interval, as well as the treated groups compared with control group at basal point. Pentazocin at a dose of 20 mg/kg showed the significant difference ( $p < 0.01$ ) compared to control group at 15, 30 and 60 min respectively (Table 3). HAECZ at a dose of 100 and 400 mg/kg showed significant difference ( $p < 0.01$ ) at 15, 30 and 60 min interval compared to control group (Table-3). Hence we found that HAECZ bark have analgesic activity which is shown in Table 3 and fig. 2.

#### **4. CONCLUSION**

In this study we attempted to use scientific methods to elucidate the analgesic properties of *Cinnamomum zeylanicum* bark. The hot plate test and tail immersion methods were used to evaluate central analgesic effect. The HAECZ bark shows a significant analgesic effect in both tail immersion and hot plate method (Table-2 and 3). The phytochemical study of HAECZ bark shows presence of carbohydrates, terpenoids, tannins, saponins, flavonoids, glycosides and steroids (Table.1). As per Rahmtullah et al., 2014 *Curcuma longa* showed analgesic and anti-inflammatory activity due to presence of chemical constituents like saponins, Tannins, flavonoids and alkaloids<sup>7</sup>. Therefore the analgesic effect of *Cinnamomum zeylanicum* bark may be due to presence of the above mention chemicals. Further studies are required to know the mechanism of action and actual chemical constituents that are responsible for analgesic activity. Here the models like tail flick and hot plate model are help to know the analgesic activity. Another model like acetic acid induced method, grid shock test, writhing test can also be used to study the analgesic effect of test drug.

#### **5. ACKNOWLEDGMENT**

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## 6. REFERENCES

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**Table 1:** Preliminary Phytochemical Evaluation.

Phytoconstituents	Results
Carbohydrates	+
Proteins	-
Terpenoids	+
Tannins	+
Saponins	+
Flavonoids	+
Alkaloids	-
Glycosides	+
Steroids	+

+ = Present, - = Absent

**Table 2:** Reaction time of Hydro Alcoholic Extract of *Cinnamomum zeylanicum* (HAECZ) bark and pentazocin using Tail Immersion model in Albino rats.

Groups	Extract/dru g	Dose(mg/kg)	Reaction Time (Sec) Mean±SEM			
			Basal	15 min	30 min	60 min
I	Control	---	4.6±0.49	5.66±0.49	5±0.36	4.66±0.66
II	Pentazocin	20	4.83±0.30	7.66±0.21*	10.6±0.33*	10.6±0.33*

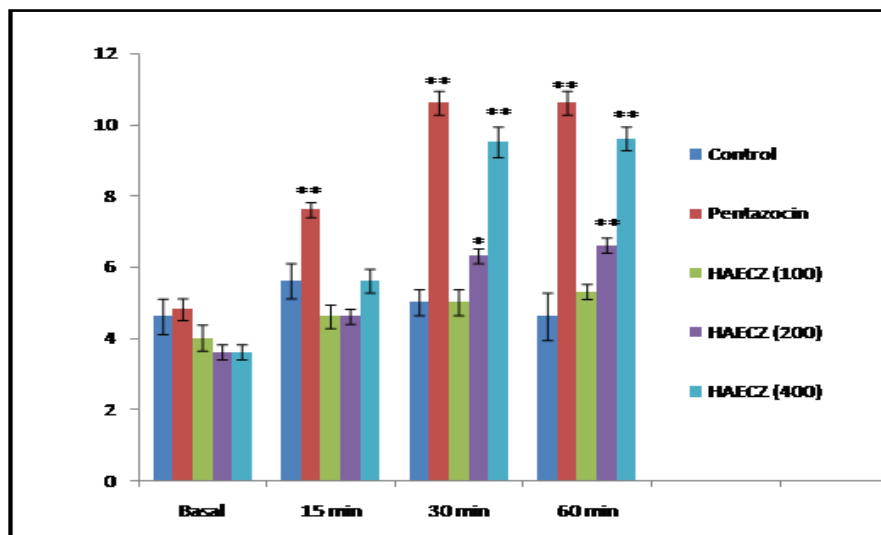
III	HAECZ	100	4±0.36	4.6±0.33	5±0.36	5.3±0.21
IV	HAECZ	200	3.6±0.21	4.6±0.21	6.3±0.21*	6.6±0.21**
V	HAECZ	400	3.6±0.21	5.6±0.33	9.5±0.42**	9.6±0.33**

Each value is represented as Mean ± S.E.M, n=6, \*  $p < 0.05$ , \*\*  $p < 0.01$  as compared to control group

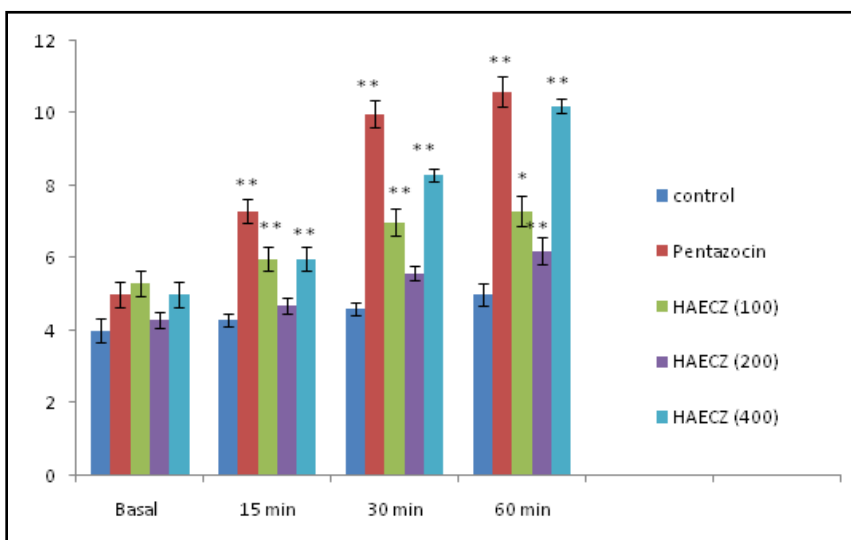
**Table-3:** Reaction Time of Hydro Alcoholic Extract of *Cinnamomum zeylanicum* (HAECZ) bark and Pentazocin using Hot Plate Model in Albino Rat.

Groups	Extract/drug	Dose(mg/kg)	Reaction Time (Sec) Mean±SEM			
			Basal	15 min	30 min	60 min
I	Control	---	4±0.33	4.3±0.1	4.6±0.19	4.6±0.30
II	Pentazocin	20	5±0.36	7.3±0.33**	10±0.36**	10.6±0.42**
III	HAECZ	100	5.3±0.33	6±0.36**	7±0.36**	7.3±0.21**
IV	HAECZ	200	4.3±0.21	4.7±0.21	5.6±0.21	6.2±0.36*
V	HAECZ	400	5±0.33	6±0.33**	8.3±0.19**	10.2±0.19**

Each value is represented as Mean ± S.E.M, n=6, \*  $p < 0.05$ , \*\*  $p < 0.01$  as compared to control group



**Fig. 1:** Effect of Hydro Alcoholic Extract of *Cinnamomum zeylanicum* (HAECZ) and Pentazocin by Tail Immersion method in albino Rats. \*  $p < 0.05$ , \*\*  $p < 0.01$  as compared to control group.



**Fig.2:** Effect of Hydro Alcoholic Extract of *Cinnamomum zeylanicum* Bark and Pentazocin by Hot Plate method in Albino Rats. \*  $p < 0.05$ , \*\*  $p < 0.01$  as compared to control group.