ANTIINFLAMMATORY ACTIVITY OF *CINNAMOMUM KERALAENSE* BARK EXTRACT

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Summary

The aim the present studies on phytochemicals and anti-inflammatory activity of ethanol extracts of *Cinnamomum keralaense* Kosterm., bark was evaluated using carrageenan induced experimental model of inflammation in albino rats. The results of the maximum dose of 400mg/kg *C. keralaense* extract exhibited a significant reduction in the volume of inflammation. In conclusion of the present results revealed that active constituents were anthraquinone, cardiac glycosides, cyanogenic glycosides, flavonoids, reducing and non-reducing sugars and saponins found in ethanolic extracts of *C. keralaense* may be anti-inflammatory effects of carrageenan-induced paw edema in rats.

Key Words: Anti-inflammatory; *Cinnamomum keralaense;* barks; phytochemicals

Introduction

Plants and plant parts found a broad range of bioactive constituents such as lipids, phytochemicals, pharmaceutics, flavors, fragrances and pigments. Plant extracts are widely used in the food, pharmaceutical and cosmetics industries. The genus *Cinnamomum* comprises 250 species which are distributed in Asia and Australia. Many species of cinnamon yield volatile oils on distillation. The most important cinnamon oils in world trade are those from *C. zeylanicum*, *C. cassia*, and *C. camphora*. Cinnamon offers a variety of oils with different aroma characteristics and composition which benefited to the flavor industry. The root bark oil was reported to have camphor as the main constituent, but does not seem to have commercial value, unlike leaf and stem bark oils. Major compounds present in stem bark oil and root bark oil are cinnamaldehyde (75%) and camphor (56%), respectively. Cinnamon bark oil possesses the delicate aroma of the spice with a sweet and pungent taste [1]. *Cinnamomum keralaense* Kosterm., tree upto 25m tall, bark grey smooth with pustular lenticels, thin, often hoop-ringed; live bark 15mm thick, light brown to reddish, odour and tasteless[2]. Since, there is no report on medicinal uses, phytochemicals and pharmacological activities of *Cinnamomum keralaense* barks. Hence, the present study was undertaken to evaluation of phytochemicals and anti-inflammatory activity of carrageenan induced experimental model of inflammation in albino rats.

Experimental Section

Plant materials collection and extraction

The barks of *Cinnamomum keralaense* were collected from Inzhikuzhi, Tirunelveli District of Tamil Nadu, India in May, 2007. The plant was identified by Dr. U. Manikandan SPKCES, M.S. University, Alwarkurichi The collected barks were air-dried and pulverised using mechanical grinder. 250g of air-dried powdered barks were coarsely powdered and subjected to successive solvent extraction with 95% ethanol. An oily extract was obtained after complete elimination of solvent under reduced pressure. The bark extract was gave (8.71%). Phytochemicals of the extracts were identified by qualitative chemical tests [3, 4].

Anti-inflammatory activity of ethanolic extract of Cinnamomum keralaense barks

Adult Wister rats (100–120g wt) were kept under standard laboratory conditions. They were divided into five different treatment groups of six animals each (Table 1). 0.2 ml equivalent of 50, 100 and 200 mg/kg of the ethanolic extract were injected intraperitoneally (i.p.) into the rats. 0.2 ml saline solution and 0.2 ml equivalent of 5 mg/kg indomethacin were administered as negative and positive controls, respectively. The paw volume of each of the rats was measured by dipping the right hind paw in the cell compartment of the plethysmometer and the volume of fluid displaced by the paw was noted. 0.1 ml (1%) carrageenan was injected into the right hind paw of all the rats under the sub-planter region to induce edema that is intra-dermal. The measurement of the paw volume was repeated using the plethysmometer [5] an hour after carrageenan injection. The latter was repeated within same interval till the fifth hour after the carrageenan injection. The ability of the extract to reduce swelling (oedema) was taken as a measure of anti-inflammatory activity. The experiment was carried out in quadruplicate and the percent inhibition was calculated with the reference to the 0.2 ml saline control

$$\% \text{ of inhibition} = \frac{(C_t - C_o) \text{ control} - (C_t - C_o) \text{ treated}}{(C_t - C_o) \text{ control}} \times 100$$

Statistical analysis

Results were expressed as the mean value ± standard error of the mean. Treated groups were compared with the controls for statistical significant differences ($P<0.005$) using paired Student's *t*-test.

Results and Discussion

Phytochemicals screening of Cinnamomum keralaense barks

The result of phytochemical screening of *Cinnamomum keralaense* barks revealed the presence of anthraquinone, cardiac glycosides, cyanogenic glycosides, flavonoids, reducing and non-reducing sugars, and saponins. Alkaloids and tannins were not detected in the barks (Table-1).

Table 1: Phytochemical analysis of *Cinnamomum keralaense* barks

Phytochemicals	Detected
Alkaloids	-
Anthraquinone	++
Cardiac glycosides	+++
Cyanogenic glycosides	++
Flavonoids	+
Reducing and non-reducing carbohydrates	+
Saponins	+
Tannins	-

"+++"Very prominent, "+"prominent, "+" present,"-" Absent

Anti-inflammatory activity of ethanolic extract of Cinnamomum keralaense barks

The percentage inhibition at 50, 100,200 and 400mg/kg/ day body weights of the tested rats for the anti-inflammatory study gave 7.17%, 38.01%, 45.17%, and 68.84% respectively, at 6h post-carrageenan administration. The ethanolic extract of the plant showed moderate anti-inflammatory activity (Table- 1). The value was lower than that of indometacin the reference drug that gave 71.96% at 5 mg/kg dose.

Table 2: Percentage inhibition of *Cinnamomum keralaense* barks extract on carrageenan rat paw induced edema

Treatment	Dose (mg/kg)	Mean paw- size in cm(Hr)					Inhibition (%)
		0	1	2	3	5	
Normal saline		2.16±0.01	2.51±0.05	3.17±0.01	4.22±0.01	3.21±0.02	-
Extract (I)	50	3.92±0.01	4.55±0.01	4.26±0.01	3.53±0.01	2.98±0.01	7.17
Extract (II)	100	3.44±0.01	2.92±0.02	2.54±0.01	2.15±0.01	1.99±0.01	38.01
Extract (III)	200	2.23±0.01	2.15±0.01	2.42±0.01	2.52±0.01	1.76±0.01	45.17*
Extract (IV)	400	2.46±0.01	2.15±0.01	1.55±0.01	1.23±0.01	1.00±0.02	68.84**
Indomentacin	5	1.25±0.01	1.47±0.01	1.27±0.01	0.99±0.01	0.90±0.01	71.96**

No. Animals = 6; Values are expressed as Mean ± SE; **P*<0.05; **P*<0.01

Carrageenan induced oedema of rat foot is used widely as a working model of inflammation in the search for new anti-inflammatory agents [6], and appeared to be the basis for the discovery of Indomethacin, the anti-inflammatory drug [7]. The oedema which develops in rat paw after carrageenan injection is a biphasic event [8]. The initial phase is attributed to the release of histamine and serotonin, the oedema maintained between the first and second phase to kinin, and the second phase to prostaglandin [9]. All the mediators appear to be dependent upon an intact complement system for their activation and release [10]. It has been shown [11] that, in the early phase of the oedema, the dominant cells are polymorphonuclears whereas in advanced stages mononuclears predominate. In our study indomethacin (non-steroidal) anti-inflammatory drugs were tested on carrageenan oedema.

It was noticed that Indomethacin treated on oral administration of 5 mg/kg respectively (Table -2) showed a significant inhibitory effect was 4 and 5hrs carregeenan injection. Deepak and Swami, [12] reported showed a moderate activity, among them, *A. viminalis* that was included in this assay because its content in ursolic acid, a triterpene, which has already been reported as very active on carrageenan induced edema test. Meckes et al.,[13], reported % of inhibition produced by the methanol extract of *A. viminalis* was close to the effect registered with the methanol extract of *B. paniculata* and *J. spicigera* (40– 45% inhibition). *B. paniculata* extract contains xanthomicrol in high concentrations [14], this methoxiflavone has proved to be a LTC4 and thromboxane B2 inhibitor [15]. Antiinflammatory activity of *J. spicigera* has not been reported before, although a potent activity was described for lignan glycosides isolated from the species *Justicia ciliata* [16]. The present study maximum 68.84% inhibition produced by the ethanol extract of *Cinnamomum keralaense* barks extract and effective dose 400mg/kg of effective antiinflammatory time was observed (4-5hr). Antiinflammatory effect may be active constituents were anthraquinone, cardiac glycosides, cyanogenic glycosides, flavonoids, reducing and non-reducing sugars, and saponins found in *Cinnamomum keralaense* barks. Further investigation should be going on exact mode of action of individual constituents of *Cinnamomum keralaense* barks.

Conclusion

It can be conclude that anti-inflammatory activity of ethanol extracts of *Cinnamomum keralaense* Kosterm., bark shows carrageenan induced inflammation for albino rats were studied. Maximum dose of 400mg/kg *C. keralaense* extract exhibited a significant reduction in the volume of inflammation (68.84%). Active constituents were anthraquinone, cardiac glycosides, cyanogenic glycosides, flavonoids, reducing and non-reducing sugars and saponins found in ethanolic extracts of *C. keralaense* may be anti-inflammatory effects of carrageenan-induced paw edema in rats.

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