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Original Research Article

Antipyretic Activity of *Ampelocissus araneosa* Planch. (Vitaceae) on Brewer's Yeast Induced Pyrexia in Rabbit

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Abstract

The present study was designed to evaluate the antipyretic activity of methanol extract of *Ampelocissus araneosa* leaf, stem and root at a dose of 200 mg/kg and 400 mg/kg against Brewer's Yeast induced pyrexia in rabbit. The methanol leaf extract showed more significant effect ($p<0.001$) in lowering the hyperthermia than the stem and root extracts, but found to have similar effect as the standard drug Aspirin (10 mg/kg).

Keywords

Ampelocissus araneosa
Antipyretic activity
Brewer's yeast
Methanol extract

Introduction

Pyrexia or fever is caused as a secondary impact of infection, malignancy or other diseased states. It is the body's natural function to create an environment where infectious agents or damaged tissues cannot survive. Normally, the infected or damaged tissue initiates the enhanced formation of pro-inflammatory mediators (Cytokines, such as interleukin 1β, α, β and TNF-α), which increase the synthesis of prostaglandin E2 (PgE2) near hypothalamic area and thereby trigger the hypothalamus to elevate the body temperature. When body temperature becomes high, the temperature regulatory system, which is governed by a nervous feedback mechanism, dilates the blood vessels and increases sweating to reduce the temperature. When the body temperature becomes low, hypothalamus protects the internal temperature by vasoconstriction. High fever often increases faster disease progression by increasing tissue catabolism, dehydration, and existing complaints, COX-2 expression to reduce the elevated body temperature by inhibiting PgE2 biosynthesis. These synthetic agents irreversibly inhibit COX-2 with a high selectivity and are toxic to the hepatic cells, glomeruli, cortex of brain and heart muscles. Natural COX-2 inhibitors have lower selectivity with fewer side effects (Spacer and Breder, 1994; Luo et al., 2005). A natural antipyretic agent with reduced or no toxicity is therefore, essential.

Ampelocissus araneosa is a climbing shrub, found in moist deciduous to evergreen forests in Kerala, Karnataka and Tamil Nadu. It is called Kattu thiratchai in Tamil, Asvakathara in Sanskrit and Kauraj, Ghorvel

in Hindi. The roots are used in Ayurveda, Siddha and Unani system of medicine as a cooling agent and astringent (Prajapati et al., 2003). Hence, the present study was designed to determine the antipyretic effect of methanol extract of leaf, stem and root of *Ampelocissus araneosa*.

Materials and methods

Collection of plant material

The fresh whole plant of *Ampelocissus araneosa* was collected from Yercaud, Salem district, Tamil Nadu. The plant was identified and authenticated by Botanical Survey of India, Coimbatore. The leaves, stem and root collected were washed and cleaned to remove foreign organic matter, cut into small pieces and then kept for drying in shade. The dried plant parts were made into coarse powder. These powdered materials were stored in air tight containers and used for further extraction.

Preparation of extract

The collected plant material dried and pulverized to coarse powder. The powder material subjected to cold maceration process i.e., weighed quantity of powder placed into the maceration flask and added with appropriate quantity of methanol, set aside for 48h. After maceration, solvent menstruum filtered from the marc and evaporated to get dried extract. The extracts were stored in air tight container and used for further experimental purposes.

Experimental animals

The experiment was carried out on albino rabbits of either sex with the average weight of 1.5 - 2.0 kg were kept in cages, maintained at 23-25°C and were given standard diet. Food was withdrawn 24h prior to the experiments but had free access to water. Experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC) with the Reg. No. 688/02/C/CPCSEA.

Brewer's yeast induced pyrexia in rabbit

In this method, rabbits were divided into nine groups of six animals each. Group I serves as a normal control which received 0.5% CMC. Group II serves as a negative control, Pyrexia was induced to Group II to Group IX by injecting 10 ml/kg of 20% w/v brewer's yeast suspension with 0.5% w/v CMC to each rabbit (at marginal ear vein). The rabbits will become hyperthermic.

Group III receives 10 mg/kg body weight of standard aspirin. Group IV and V received 200 and 400 mg/kg body weight of methanol leaf extracts. Group VI and VII received 200 and 400 mg/kg body weight of methanol stem extracts. Group 8 and 9 received 200 and 400 mg/g body weight of methanol root extracts. Basal rectal temperature was measured by inserting digital clinical thermometer probe to a depth of 2 cm into the rectum before the injection of yeast. The rise in rectal temperature was recorded 19 h after yeast injection. Rectal temperature of animals was noted at regular intervals following the respective treatments. The temperature was measured for every 1 h starting from 0 h to 4 h after drug administration (Niazi et al., 2010).

Statistical analysis

All the results were expressed as mean ± standard error of mean (S.E.M.). Data were analyzed using one-way ANOVA followed by Dunnett's t-test. The analysis was carried out using Graph pad software of version 4. $p<0.05$ was considered as statistically significant.

Results and discussion

The experiment showed (Table 1) that the leaf extract exhibited statistically more significant effect ($p<0.001$) in lowering the hyperthermia than the stem and root extracts, but found to have similar effect as the standard drug aspirin administration. The stem and root extracts have moderately significant effect ($p<0.01$) compared to standard drug aspirin. The extracts are likely to reduce pyrexia by reducing brain concentration of prostaglandin E2 especially in the hypothalamus through its action on COX.

It is known fact that hypothalamus gland is responsible for rising or decreasing the normal body temperature (37°C) of an individual which ensures a balance between heat production and heat loss. The disturbance of hypothalamic thermostat leads to rising of body temperature which results in complaint of fever.

The methanolic extracts of *Ampelocisssus latifolia* leaf at 300 mg/kg and 500 mg/kg doses showed a significant antipyretic activity when compared with standard drug Aspirin has been recently reported (Dandekar and Lokhande, 2014).

Table 1. Effect of methanol extracts of *Ampelocissus araneosa* on Brewer's Yeast induced pyrexia in rabbits.

Group	Drug treatment with dose	Rectal temperature in °C after yeast injection				
		0h	1h	2h	3h	4h
I	Normal control	38.06±1.02	38.08±0.98	37.89±0.76	38.12±1.03	38.53±0.98
II	Negative control	40.56±1.65	40.81±1.35	41.26±1.98	41.64±0.97	42.01±1.24
III	Standard (Aspirin 10mg/kg)	39.84± 0.87***	39.42± 0.86***	39.16± 1.32***	39.04± 0.89***	38.81± 1.20***
IV	Methanol leaf extract 200mg/kg	40.53± 0.84***	40.16± 1.32***	40.02± 0.84***	39.89± 1.34***	39.64± 0.54***
V	Methanol leaf extract 400mg/kg	39.92±0.68***	39.68±0.91***	39.53±1.05***	39.37±1.08***	39.02±0.84***
VI	Methanol stem extract 200mg/kg	40.72± 1.14**	40.56±0.92**	40.41± 1.24**	40.24± 0.98**	40.01± 0.57**
VII	Methanol stem extract 400mg/kg	40.61± 2.01**	40.32± 0.94**	40.26± 1.32**	40.11± 0.98**	39.98± 0.84**
VIII	Methanol root extract 200mg/kg	40.68± 0.97**	40.58± 0.79**	40.51± 0.97**	40.35± 0.95**	40.18± 0.96**
IX	Methanol root extract 400mg/kg	40.63± 1.65**	40.49± 1.28**	40.35± 1.02**	40.26± 0.96**	40.03± 0.67**

Values are expressed as mean ± SEM (n = 6), *p<0.05, **p<0.01 and ***p<0.001, when compared with control.

Usually most anti-inflammatory and analgesic drugs possess antipyretic activity. In general, the non-steroidal anti-inflammatory drugs produce their antipyretic action by inhibiting synthesis of prostaglandin within hypothalamus (Hayare et al., 2000). Flavonoids are known to target prostaglandins which are involved in the pyrexia (Rajnarayana et al., 2006). Hence the presence of flavonoids in the methanolic extract of *Ampelocissus araneosa* leaves may be contributory to its antipyretic activity.

Conclusion

The outcome of this study indicates that the methanol extract of *Ampelocissus araneosa* leaf, stem and root possess antipyretic activity at the tested doses. However, methanol leaf extracts showed better action when compared to stem and root extract. This could provide a rationale for the use of this plant in pain as an herbal medicine without any side effects.

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