

EVALUATION OF ANTHELMINTIC ACTIVITY OF CAESALPINIA PULCHERRIMA (L). BARK AGAINST PHERETIMA POSTHUMA

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ABSTRACT

The crude aqueous and hydroalcoholic extracts of *Caesalpinia pulcherrima* (Caesalpinaceae) bark were evaluated for in-vitro anthelmintic activity on the Indian adult earthworms *Pheretima posthuma*. The various concentrations (10,25,50mg/ml) of extracts were tested in-vitro for anthelmintic potency by determination of time of paralysis and time of death of worm. The bark extracts of *Caesalpinia pulcherrima* exhibited a dose dependant inhibition of spontaneous motility (Paralysis) of earthworms. Albendazole(10mg/ml) is used as standard drug. Both the extracts were found to be more potent than albendazole. As compared to aqueous extract, hydroalcoholic extract took less time to cause paralysis & death of the earthworm. Thus the present study demonstrates that the bark of *Caesalpinia pulcherrima* could be categorized under anthelmintic herbal drugs and could be used as a potent key ingredient of herbal formulation.

Keywords: *Caesalpinia pulcherrima*, Anthelmintics, *Pheretima posthuma*.

INTRODUCTION

Helminth or worm infection is one of the major global public health problems, more in tropical countries. Helminthes infections are being recognized as a cause of much acute as well as chronic illness among the various human beings as well as animals. Anthelmintic or antihelminthics are drugs that expel parasitic worms (helminths) from the body, by either stunning or killing them¹. The majority of drugs available to treat these infections possess some common side effects like nausea, vomiting, abdominal pain, expulsion of ascaris from mouth or nose, allergic reactions, loss of hair, urticaria, granulocytopenia, fall in blood pressure, sedation, fever, body ache etc². Therefore, there is a scope for search of new drugs especially from the herbal origin, which are known to possess negligible side effect and better potency.

Plants belonging to the family Caesalpinaceae have wide folklore medicinal uses. *Caesalpinia pulcherrima* popularly known as Guleture is widely distributed in India³. Plant is used as emmenagogue, purgative, stimulant, and abortifacient. The different parts of this plant like bark, flower, leaves have been used in common remedies for treatment of a number of disorders including pyrexia, menoxenia, wheezing, bronchitis, antiviral, and malarial infection. The bark is used as an abortifacient and an infusion of leaves is used as abortifacient and cathartic^{4,5,6}. The plant is rich in many pharmaceutical active ingredients like flavonoids, carotinoids, glycosides, phenols and steroids. The stems contain a cassane-type diterpene ester, pulcherralpin, peltogynoids, bhonducellin, and 6-methoxypulcherrimin, homoisoflavonoids⁷. The objective of the present work is to evaluate the anthelmintic activity of hydroalcoholic & aqueous extracts of *Caesalpinia pulcherrima* stem bark on worms.

MATERIALS AND METHODS

Collection of plant & Authentication

The bark of the *Caesalpinia pulcherrima* (L.) was collected from the Pune District of Maharashtra, India during Aug- Sept. 2010. The plant was authenticated from Botanical survey of India, Pune

(Ministry of environment and forest) –A voucher specimen No-SATNCAEPU3.

Preliminary phytochemical investigation

Phytoconstituents were detected by applying qualitative chemical tests on hydroalcoholic and aqueous extracts of *Caesalpinia pulcherrima* L. bark.

Preparation of extract

The barks after collection were shade dried, powdered to get a coarse powder. The dried powdered material (1300 gm) was thoroughly mixed, taken in 1 liter beaker and sufficient quantity of alcohol (50% ethanol) was added, then it was kept for maceration for 7 days. The hydroalcoholic extract obtained was filtered and concentrated on hot plate (Yield:18.70%). Similarly, the aqueous extract of barks was prepared by macerating coarse powder for 7 days, filtered and concentrated (Yield: 12.51%).

Different concentrations of both extracts (10, 25, 50mg/ml) were prepared with the help of 1% acacia in normal saline. All the solutions were evaluated for anthelmintic activity. Albendazole solution of concentration 10mg/ml was prepared similarly and used as standard.

Experimental Model

Adult Indian earthworms, *Pheretima posthuma* having anatomical and physiological resemblance with intestinal roundworm parasite of the human being,^{8, 9} were used to evaluate anthelmintic activity. These were collected from moist soil and washed with normal saline to remove all faecal matter.

Anthelmintic activity

The anthelmintic assay was carried out as per the method of Ajaiyeoba et al¹⁰. Eight petridishes of equal size were taken & numbered. Six earthworms of similar sizes were placed in each petridish as indicated in Table No.1. Albendazole is used as a reference standard and 1%gum acacia in normal saline as a control.

Table 1: Arrangement of the Petri dishes, Earthworms, Plant extracts and Standard drug

Petri dish no.1	Earthworms+50 ml of the hydroalcoholic extract (10mg/ml)
Petri dish no.2	Earthworms+50 ml of the hydroalcoholic extract (25mg/ml)
Petri dish no.3	Earthworms+50 ml of the hydroalcoholic extract (50mg/ml)
Petri dish no.4	Earthworms+50 ml of the aqueous extract (10mg/ml)
Petri dish no.5	Earthworms+50 ml of the aqueous extract (25mg/ml)
Petri dish no.6	Earthworms+50 ml of the aqueous extract (50mg/ml)
Petri dish no.7	Earthworms+50 ml of the aqueous albendazole (10mg/ml)
Petri dish no.8	Earthworms+50 ml of 1%gum acacia in normal saline

Observations were made for the time taken for paralysis and death of worms. Paralysis was said to occur when worm did not revive in normal saline. Time for death of worms was recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water (50°C), followed with fading away of their body colours.

RESULT AND DISCUSSION

Preliminary Phytochemical screening

The phytochemical screening revealed that hydroalcoholic and aqueous extract contain gums and mucilage, flavonoids, alkaloids, steroids, tannins, glycosides and saponins.

Anthelmintic activity

The extracts of *Caesalpinia pulcherrima* (L.) bark produced a significant anthelmintic activity in dose dependent manner as shown in Table 2. Hydroalcoholic extract took less time to cause paralysis & death of the earthworms as compared to aqueous extract. Thus hydroalcoholic extract was found to be more potent than aqueous extract.

Data (Table 2) reveals that all the three concentrations of aqueous and hydroalcoholic extract (10, 25 & 50 mg/ml) show better & potent anthelmintic activity than that of standard drug Albendazole. The above findings justify the anthelmintic properties of the *Caesalpinia pulcherrima* bark.

Table 2: Data of time taken for paralysis and death of earthworms:

Drug	Concentration (mg/ml)	Time For Paralysis(min) Mean±SEM	Time For Death (min) Mean±SEM
Normal saline(50ml)	-	-	-
Albendazole	10	50.35±0.1070	75.92±0.29
Aqueous Extract	10	27.61 ±1.321	53.73±1.43
Aqueous Extract	25	20.77 ±0.39	30.32±0.10
Aqueous Extract	50	17.49 ±0.52	26.63±2.56
Hydroalcoholic Extract	10	26.78 ±0.29	47.25±0.90
Hydroalcoholic Extract	25	20.23 ±0.922	26.48±0.419
Hydroalcoholic Extract	50	17.07 ±0.233	23.86 ±0.58

All the results were expressed as Mean ±S.E.M (n=6). By employing one way ANOVA, all data were found to be statistically significant (p<0.001).

CONCLUSION

It could be concluded that both aqueous extract and hydroalcoholic extract of *Caesalpinia pulcherrima* (L.) Sw. barks possess potent anthelmintic activity. Thus *Caesalpinia pulcherrima* (L.) Sw. bark can be used in controlling the diseases caused by worms. But further studies are required to identify the actual chemical constituents that are present in the crude extracts of this plant which are responsible for anthelmintic activity and to establish the effectiveness and pharmacological rationale for the use of *Caesalpinia pulcherrima* as an anthelmintic drug.

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