



## IN VITRO ANTHELMINTIC ACTIVITY OF *SWIETENIA MAHAGONI* SEED EXTRACTS AGAINST *PHERITIMA POSTHUMA*

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### ABSTRACT

*Swietenia mahagoni* belongs to Meliaceae family, native to West Indies. The plant is commonly known as "mahogani." This timber tree is mainly cultivated in tropical zones such as India, Malaysia and Southern China. In the present study, Crude aqueous, chloroform and acetone extracts of *Swietenia mahagoni* seeds were evaluated for *in-vitro* anthelmintic activity on the Indian adult earthworms *Pheretima posthuma*. Among all the solvent extracts, aqueous extract showed potent activity (paralysis and death time was  $07.74 \pm 0.26$  and  $23.47 \pm 0.19$  min) as compared to chloroform and acetone extract at the concentration of 80mg/ml, while Piperazine citrate is used as standard drug (paralysis and death time was  $8.03 \pm 0.32$  and  $15.39 \pm 0.28$  min) at the concentration of 20mg/ml. Phytochemical analysis showed the presence of alkaloids, tannins and phenolic compounds may be the active compounds.

**Keywords:** Anthelmintic activity, *Swietenia mahagoni*, *Pheretima posthuma*, piperazine citrate.

### INTRODUCTION

Parasitic helminths affect animals and man, causing considerable hardship and stunted growth. Most diseases caused by helminths are of a chronic, debilitating nature; they probably cause more morbidity and greater economic and social deprivation among humans and animals than any single group of parasites. More than half of the population of the world suffers from various types of infection and majority of cattle's suffers from worm infections<sup>1</sup>. The disease is highly prevalent particularly in third world countries due to poor management practices<sup>2</sup>. Anthelmintics are those agents that expel parasitic worms (helminthes) from the body, by either stunning or killing them. The gastro-intestinal helminthes becomes resistant to currently available anthelmintic drugs therefore there is a foremost problem in treatment of helminthes diseases<sup>3</sup>. Hence there is an increasing demand towards natural anthelmintics.

*Swietenia mahagoni* (Family Meliaceae) evergreen to semi evergreen tree, commonly known as "mahogani" native to tropical America, Mexico and South America<sup>4</sup> and extensively planted mainly in Southern Asia (India, Sri Lanka and Bangladesh). The seeds of the plant reported to possess several ethno medicinal uses and proved to have antibacterial and antifungal property<sup>5</sup> and found to inhibit platelet activating factor (PAF)-induced platelet aggregation<sup>6</sup>. Ethanolic seed extract of this plant showed *in vitro* antioxidant activity<sup>7</sup>. On the basis of above background, the present study was under taken to evaluate the anthelmintic activity of *Swietenia mahagoni* seeds.

### MATERIALS AND METHODS

#### Plant material

Fresh, mature fruits of *Swietenia mahagoni* were collected in the month of October, 2010 from Hooghly District, West Bengal, India and were authenticated by botanist Prof. Pradeep Mehta, Department of Botany, Dr. H. S. Gour Central University, Sagar (M.P). A voucher specimen no. Bot/Her/1001-has been submitted at the Departmental herbarium of Department of Botany, Dr. H.S. Gour Central University, Sagar (MP, India).

#### Drugs and chemicals

The following chemicals and drug were used: Sodium chloride (HIMEDIA), chloroform and acetone (Qualigens) and Piperazine citrate (R.K. Pharmacy, Sagar).

#### Preparation of extracts

The fruits were cut into pieces to obtain seeds then the seeds were shade dried at room temperature to prevent the loss of active constituents. The dried seeds were subjected to size reduction to a coarse powdered using a mechanical grinder. The powdered plant materials (35g) were soaked separately in 500 ml of each distilled water, chloroform and acetone in a conical flask. This was covered, shaken every 30 min. for 6 hrs, allowed to stand for about 72 hrs. The solution was subsequently shaken and filtered using Whatman filter paper. The filtrate was evaporated to dryness using a rotary evaporator (yield was 3.9% w/w, 3.25% w/w and 2.7% w/w). The extract was then stored below ambient temperature for further studies. The crude extract was dissolved in 5% dimethyl sulfoxide (DMSO) to prepare desired concentrations for the assessment of anthelmintic activity.



## Phytochemical analysis

Phytochemicals screening were performed to detect various compounds such as tannins, flavonoids, alkaloids, steroids etc<sup>8</sup>.

## Test organisms

Adult earthworms (*Pheretima posthuma*) in a diameter of (4-6 cm in length) were freshly collected from the Botanical garden, Department of Botany; they were washed with normal saline to remove adherent soil particles. The easy availability, anatomical and physiological resemblance of earthworms with the intestinal roundworm, parasites of human beings makes them an ideal model for anthelmintic assay<sup>9</sup>.

## Anthelmintic bioassays

Anthelmintic activity was carried out according to the method suggested by<sup>10, 11</sup>. Different concentrations of the plant extracts were freshly prepared. The experimental set up involves fourteen groups and each group contains six earthworms were treated with 15ml of desired formulations. Group 1 was served as control group being treated with normal saline, group II being treated with standard drug Piperazine citrate at the concentration of 20mg/ml. The remaining twelve groups were treated with Aqueous, Chloroform and acetone extracts (at concentration of 80, 40, 20 and 10 mg/ml) separately.

Observations were made on the basis of time taken for paralysis and death of the individual worm. The paralysis was said to occur when the worms were not able to move even in normal saline. Death was confirmed when the earthworms lost their motility and fading off their body colors<sup>12</sup>. The average value of each group is considered as the resultant value.

**Table 1:** Anthelmintic activity of *Swietenia mahagoni* seed extracts (All the values are expressed as mean  $\pm$  SEM, N=6.)

Extract	Concentration (mg/ml)	Time required to Paralyze (min)	Time required to Death (min)
Control (normal saline)	-	-	-
Aqueous Extract	10	41.27 $\pm$ 0.42	95.54 $\pm$ 0.31
	20	35.65 $\pm$ 0.14	77.59 $\pm$ 0.27
	40	20.67 $\pm$ 0.38	43.33 $\pm$ 0.45
	80	07.74 $\pm$ 0.26	23.47 $\pm$ 0.19
Chloroform extract	10	47.15 $\pm$ 0.32	109.24 $\pm$ 0.23
	20	44.83 $\pm$ 0.34	90.65 $\pm$ 0.27
	40	33.39 $\pm$ 0.18	54.72 $\pm$ 0.21
	80	20.13 $\pm$ 0.22	39.12 $\pm$ 0.17
Acetone extract	10	57.11 $\pm$ 0.34	118.28 $\pm$ 0.34
	20	46.23 $\pm$ 0.23	93.45 $\pm$ 0.41
	40	37.45 $\pm$ 0.16	67.13 $\pm$ 0.22
	80	28.04 $\pm$ 0.27	49.18 $\pm$ 0.48
Piperazine citrate	20	8.03 $\pm$ 0.32	15.39 $\pm$ 0.28

## RESULTS AND DISCUSSION

Results of present study, indicates that all the extracts showed concentration dependent anthelmintic property (Table 1), among which aqueous extract was the most potent (paralysis at 07.74 $\pm$ 0.26 and death at 23.47 $\pm$ 0.19 min) respectively at the concentration of 80mg/ml. The time duration to paralysis and death of worms was minimum when compared to chloroform (paralysis at 20.13 $\pm$ 0.22 and death at 39.12 $\pm$ 0.17min) and acetone extracts (paralysis at 28.04 $\pm$ 0.27and death at 49.18 $\pm$ 0.48min) respectively at a concentration of 80mg/ml. The phytochemical analysis of all the extracts showed the presence of tannins, alkaloids, terpenoids and steroids. The basic mechanism of action of anthelmintic drugs such as piperazine citrate is the paralysis of worms so that they are expelled with the faeces of man and animals. The extract not only showed this property but they also caused death of the worms. Some synthetic drug e.g. niclosamide and bithionol interfere with energy generation in helminthic parasites by uncoupling oxidative phosphorylation<sup>13</sup>. These drugs may reach the target site in worms either orally, by diffusion or uptake through the cuticle, however the major uptake of the drug is through cuticle<sup>14, 15</sup>. reported that the presence of tannins in crude extracts found to produce anthelmintic activity. The presence of alkaloids in extracts may have direct effect on the nervous system of nematodes or can improve tonicity of the gastrointestinal tract and thus expel the worms<sup>16</sup>.

## CONCLUSION

The aqueous extract gave better results which may be due to the higher concentration of alkaloids and tannins as compared to chloroform and acetone extracts because of its high extractive value due to the polarity. In conclusion, the present study proves the potential of *Swietenia mahagoni* seeds as an anthelmintic drug. Further studies are necessary to isolate and reveal the active compounds and to establish the mechanism of action.

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