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Anthelmintic Activity of Indian Herbs: A Boon To Humankind

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ABSTRACT

Modern synthetic medicines are highly effective in curing various diseases, but many of them show significant side effects. A large number of Indian herbs are claimed to possess anthelmintic properties. However, systematic study and standardization of activities are lacking. The present investigations are undertaken to evaluate and standardize anthelmintic activities of common Indian herbs. Aqueous and ethanolic extracts of *Plumbago zeylanica*, *Myristica fragrance* and *Saraca asoca* are studied with respect to *in vitro* anthelmintic activity against *Eisenia foetida* and *Pheretima posthuma*. Results are expressed in terms of time for paralysis and time for death. Albendazole (20mg/ml) is used as a reference standard. Ethanolic extract of *Saraca asoca* (50 mg/ml) proved to be the best death inducer against *Eisenia foetida*, whereas ethanolic extract of *Plumbago zeylanica* at concentration 50mg/ml showed highest anthelmintic activity against *Pheretima posthuma*.

Keywords: Anthelmintic, *Pheretima posthuma*, *Eisenia foetida*, *Plumbago zeylanica*, *Myristica fragrance*, *Saraca asoca*.

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INTRODUCTION:

Helminth infections in man are highly common and affect a large population of the world¹. A large threat to public health is posed in developing countries because of the contribution of this infestation to the prevalence of anaemia, malnourishment, eosinophilia, pneumonia etc. Typically the worms (helminths) reside in the gastrointestinal tract but some may burrow into other organs. Anthelmintics are drugs that destroy or expel parasitic intestinal worms from the body. Abdominal pain, anorexia, vomiting, nausea, headache and diarrhoea are however common side effects shown by the existing anthelmintics². Also, the synthetic drugs are out of reach of millions of people. In view of this an attempt has been made here to study the anthelmintic activity of Indian herbs.

Plumbago zeylanica (Family-Plumbaginaceae) is native to warm temperate to tropical region on the earth. This herb is in use since ancient times in traditional and ayurvedic system of medicine. The roots have carminative, laxative, expectorant and astringent properties³.

Myristica fragrance (Family-Myristicaceae) grows into a tree of about 25 feet high & is native to Indonesia & India. Its kernel is profoundly used as carminative, stimulant, flavouring agent etc⁴.

Saraca asoca (Family-Caesalpinaceae) is one of the most ancient trees of India⁵. All the parts of this plant are considered to contain medicinal properties. This versatile plant has anticancer, anti-menorrhagic, antioxytocic and antimicrobial activity.

The present study is an attempt to evaluate and standardize the anthelmintic activity of above mentioned three Indian herbs by using an *in vitro* model with *Pheretima posthuma* and *Eisenia foetida* as experimental animals.

MATERIALS AND METHOD:

Collection and identification of Plants

Information regarding vernacular name, plant parts used, etc. was collected and authentic identification of plants was done with the help of different flora and monographs.⁶⁻²⁰

Extraction Procedure

Plant parts (Refer table 1) were air dried and reduced to fine powder in a pulveriser. Aqueous and alcoholic extracts of respective plant parts were concentrated²¹.

Table 1: Indian herbs and their parts under current study

Sr. No.	Plant names	Vernacular name	Part used
1	<i>Plumbago zeylanica</i>	Chitrak	Roots
2	<i>Myristica fragrance</i>	Nutmeg	Kernels
3	<i>Saraca asoca</i>	Ashoka	Leaves

Experimental animals

Pheretima posthuma (Indian Earthworm) were collected from moist soil, near Government College of Pharmacy, Vidyanagar Karad (India) and *Eisenia foetida* were collected from Vermiculture plant, Saidapur, Karad (India). The collected worms were washed with normal saline (0.9% w/v NaCl) to remove soil and dirt. The collected *Pheretima posthuma* measured 14cm in length and 3mm in diameter whereas, *Eisenia foetida* were 17cm long and 6mm wide approximately. Identity of worms was confirmed by a registered veterinary practitioner at Kanfe Globuz pet polyclinic, Kolhapur (India).

Evaluation of anthelmintic activity

Adult *Eisenia foetida* & *Pheretima posthuma* were used to evaluate anthelmintic activity of various phytoextracts because of their anatomical and physiological resemblance with intestinal round worm parasites of human beings²²⁻²⁷. Test samples of various extracts were prepared at the concentrations 20mg/ml and 50mg/ml in double distilled water.

Anthelmintic activity of extracts was assessed by comparing the paralysis time and death time required for worms in presence of various extracts and comparing it with 20mg/ml Albendazole as a reference standard and normal saline as control²⁸⁻³⁰. All experiments were done in triplicate. The time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Time for death of worms were recorded after ascertaining that the worms neither moved when shaken vigorously nor when dipped in warm water (50°C)^{26,30-32}.

RESULTS AND DISCUSSION:

Study with respect to *Eisenia foetida*.

Paralysis and death of *Eisenia foetida* were recorded at 26 and 48 minutes respectively with reference standard. The time for paralysis with the plant extracts under study ranged between 24 minutes to 29 minutes at 20mg/ml extract concentration and 16 minutes to 24 minutes at 50mg/ml extract concentration (Refer figure 1-4).

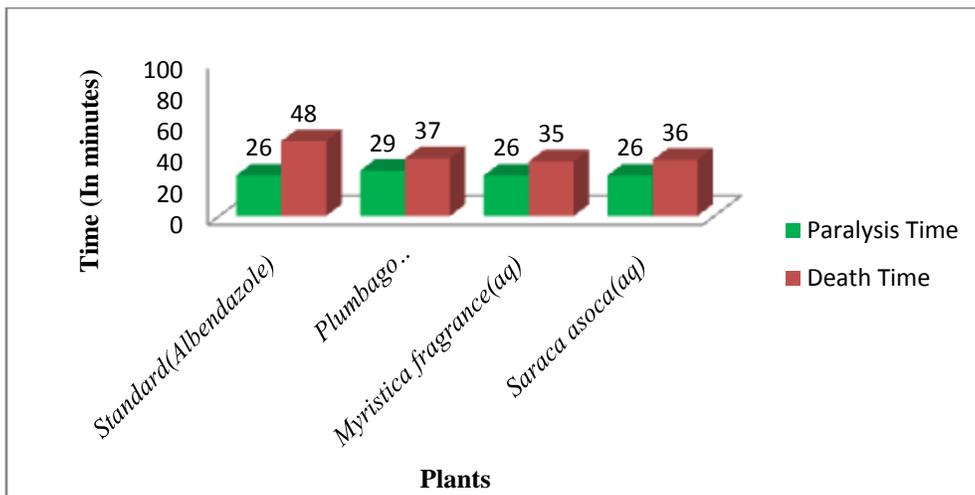


Figure 1: Anthelmintic activity of aqueous plant extracts at 20mg/ml against *Eisenia foetida*

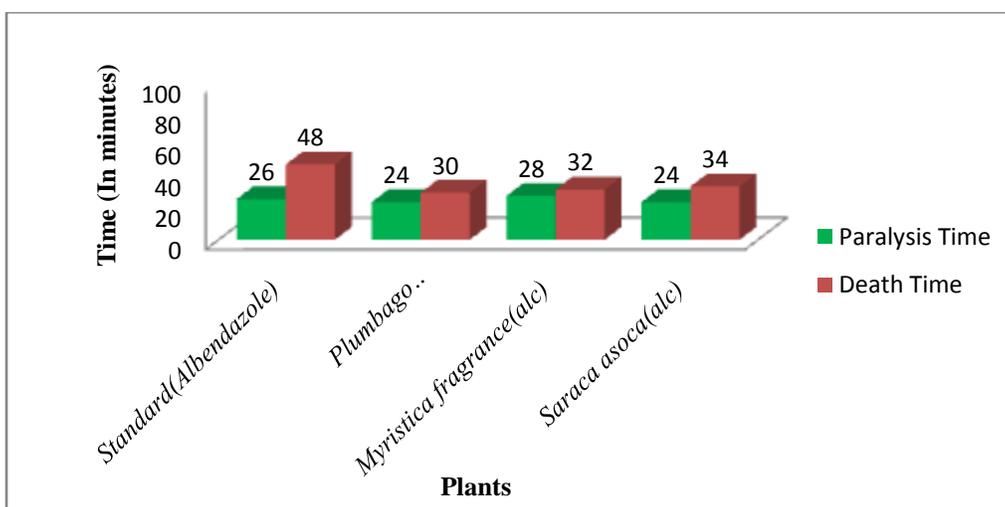


Figure 2: Anthelmintic activity of ethanolic plant extracts at 20mg/ml against *Eisenia foetida*

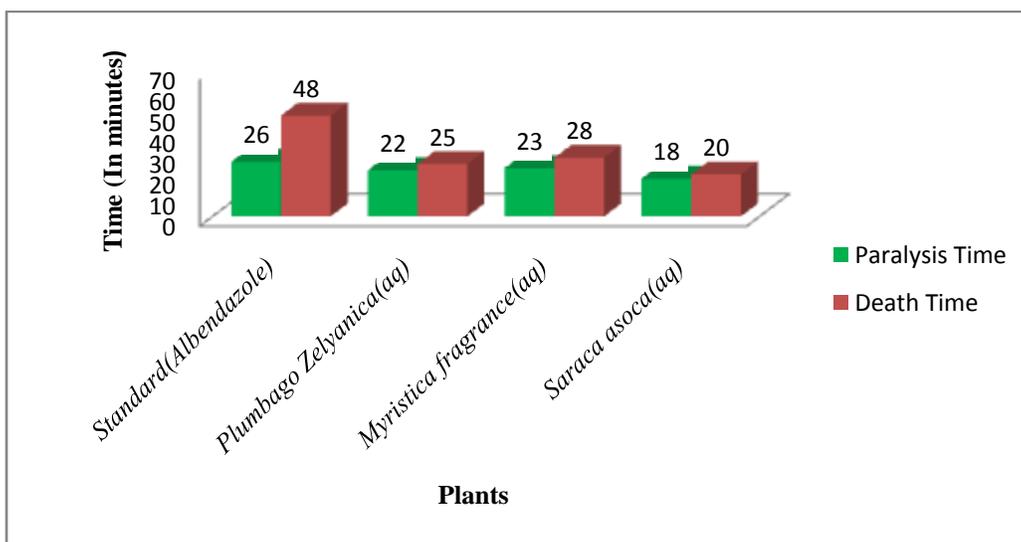


Figure 3: Anthelmintic activity of aqueous plant extracts at 50mg/ml against *Eisenia foetida*

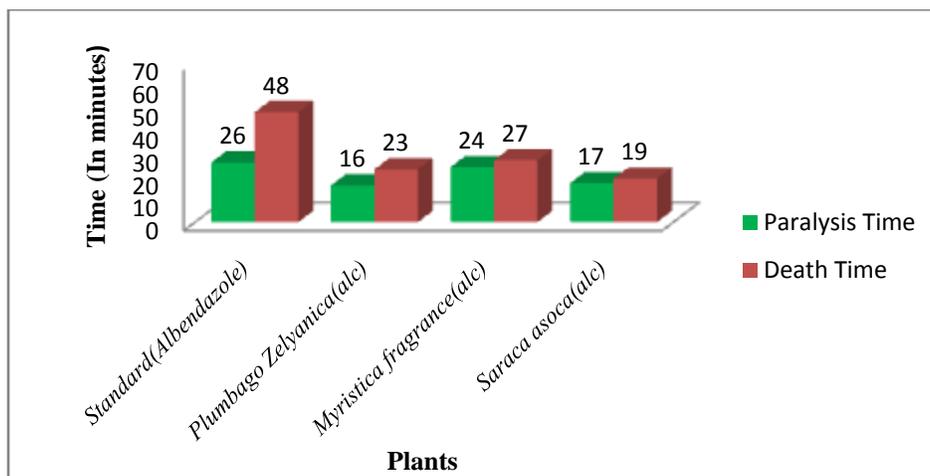


Figure 4: Anthelmintic activity of ethanolic plant extracts at 50mg/ml against *Eisenia foetida*

Aqueous and alcoholic extract of *Plumbago zeylanica*, *Myristica fragrance* and *Saraca asoca* took 30 to 37 minutes to kill *Eisenia foetida* at the concentration of 20mg/ml (Refer figure 1-2), whereas a range between 19 minutes and 28 minutes was needed for the death of *Eisenia foetida* at the concentration of 50 mg/ml (Refer figure 3-4), all the timings being lesser than required for killing *Eisenia foetida* by reference standard (20mg/ml).

Study with respect to *Pheretima posthuma*.

Paralysis and death of *Pheretima posthuma* were recorded at 30 minutes and 42 minutes, respectively with reference standard. The time for paralysis with the plant extracts under study ranged between 21 minutes and 35 minutes at 20mg/ml extract concentration and 15 minutes and 26 minutes at 50mg/ml extract concentration (Refer figure 5-8).

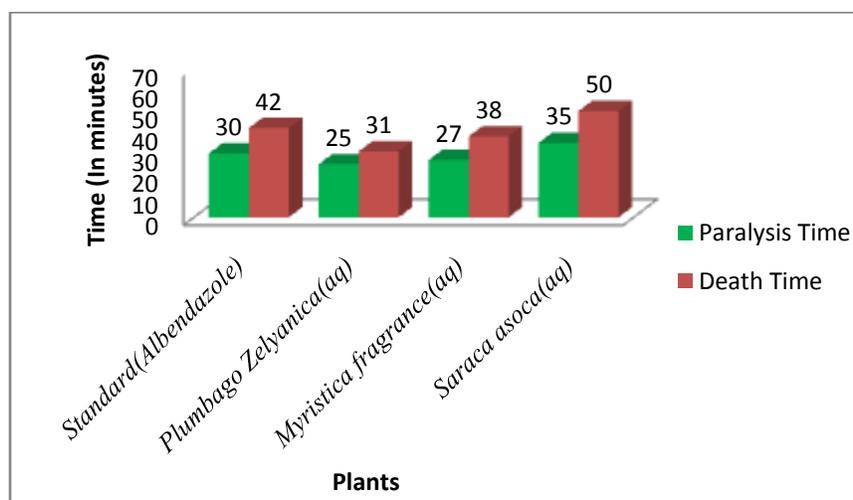


Figure 5: Anthelmintic activity of aqueous plant extracts at 20mg/ml against *Pheretima posthuma*

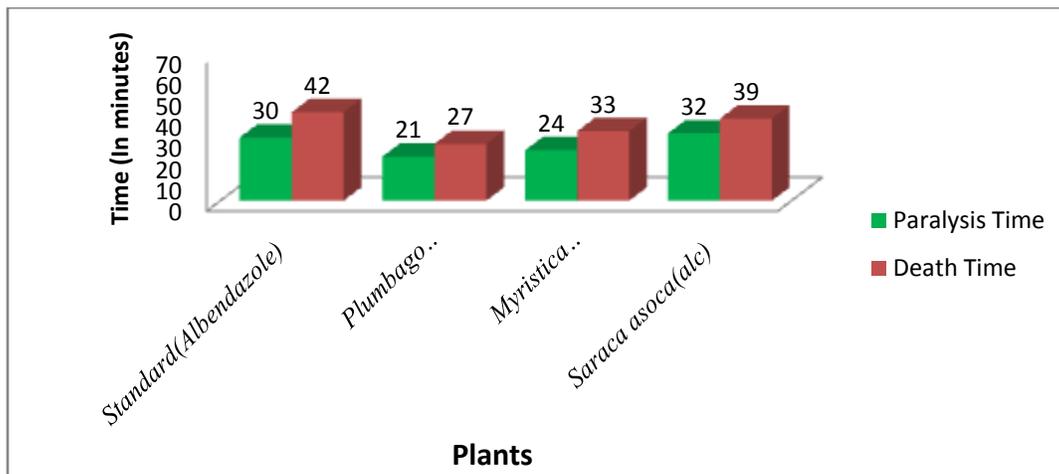


Figure 6: Anthelmintic activity of ethanolic plant extracts at 20mg/ml against *Pheretima posthuma*

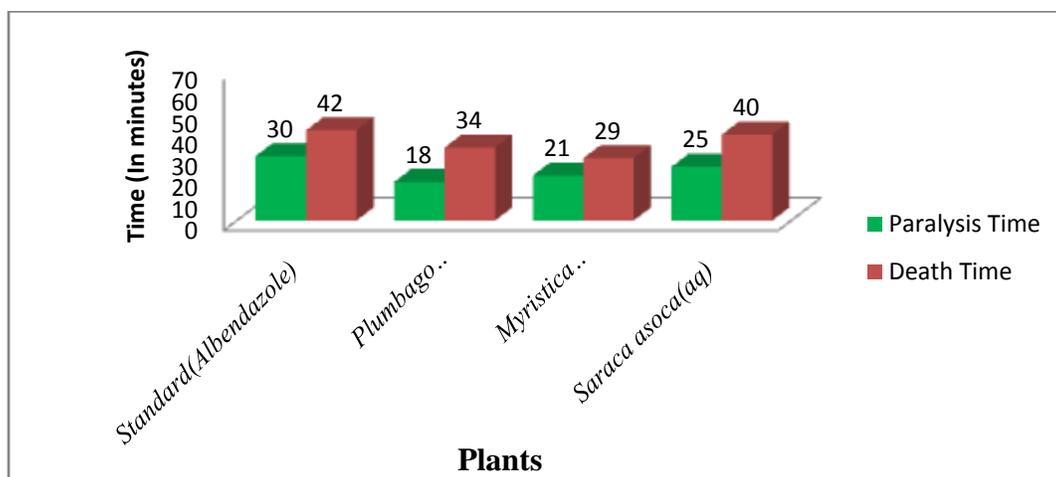


Figure 7: Anthelmintic activity of aqueous plant extracts at 50mg/ml against *Pheretima posthuma*

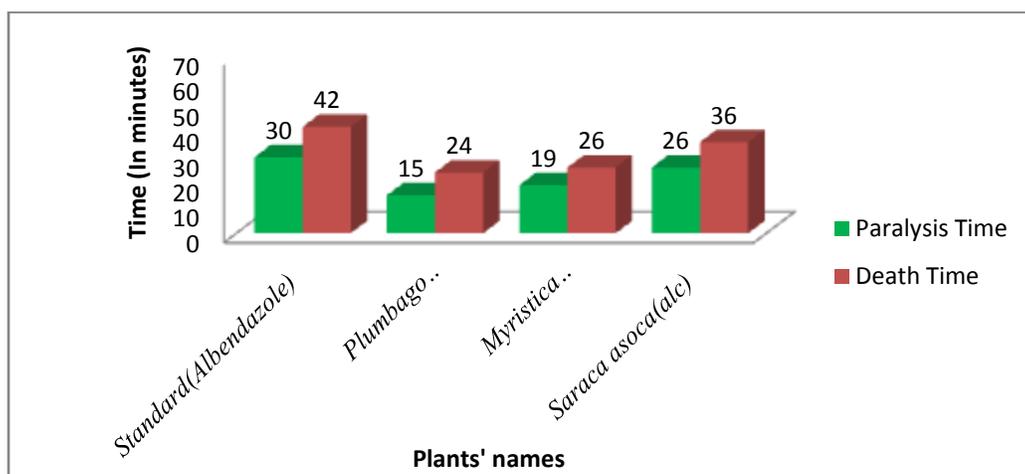


Figure 8: Anthelmintic activity of ethanolic plant extracts at 50mg/ml against *Pheretima posthuma*

Aqueous and alcoholic extracts of plants under study, viz., *Plumbago zeylanica*, *Myristica fragrance* and *Saraca asoca* took a broad range of 27 minutes to 50 minutes to kill *Pheretima posthuma* at the concentration of 20mg/ml (figure 5-6), whereas a range between 24 minutes and 40 minutes was needed for the death of *Pheretima posthuma* at the concentration of 50 mg/ml.

Analysis

Percent decrease study with respect to paralysis and death of *Eisenia foetida* clearly suggested a dose dependent result under a set of conditions applied during evaluation. A sharp decrease over 60 % was shown by ethanolic extract of *Saraca asoca* and 52% decrease with ethanolic extract of *Plumbago zeylanica* at the concentration of 50mg/ml in death time of *Eisenia foetida* (Refer table 2).

Table 2: In-Vitro anthelmintic activity of plant extracts against *Eisenia foetida*.

Sr. No.	Plant names	Type of Extract	Concentration of extract (mg/ml)	Percentage decrease in Paralysis time	Percentage decrease in Death time
1	<i>Plumbago zeylanica</i>	Aqueous	20	-11.53	22.91
			50	15.38	47.92
		Ethanolic	20	7.69	37.5
			50	38.47	52.08
2	<i>Myristica fragrance</i>	Aqueous	20	0	27.08
			50	11.54	41.67
		Ethanolic	20	-7.69	33.33
			50	7.70	43.75
3	<i>Saraca asoca</i>	Aqueous	20	0	25
			50	30.76	58.33
		Ethanolic	20	7.69	29.16
			50	34.61	60.41

Table 3: In-Vitro anthelmintic activity of plant extracts against *Pheretima posthuma*

Sr. No.	Plant names	Type of Extract	Concentration of extract (mg/ml)	Percentage decrease in Paralysis time	Percentage decrease in Death time
1	<i>Plumbago zeylanica</i>	Aqueous	20	16.67	26.19
			50	40	19.04
		Ethanolic	20	30	35.72
			50	50	42.86
2	<i>Myristica fragrance</i>	Aqueous	20	10	9.52
			50	30	30.96
		Ethanolic	20	20	21.43
			50	36.66	38.09
3	<i>Saraca asoca</i>	Aqueous	20	-16.67	-19.04
			50	16.67	4.76
		Ethanolic	20	-6.67	7.14
			50	13.33	14.29

Paralysis and death time study with respect to *Pheretima posthuma* showed an interesting feature with ethanolic extract of *Plumbago zeylanica* at 50mg/ml concentration, with the decrease in death time by 48.9% (Refer table 3).

CONCLUSION:

From above results it is concluded that ethanolic extract of *Saraca asoca* leaves at 50mg/ml concentration has shown the best anthelmintic activity among all studied plants against *Eisenia foetida*. Ethanolic extracts of plants are proved to be better paralyzers and death inducers as compared to aqueous extracts. Ethanolic extract of *Plumbago zeylanica* at concentration of 50mg/ml is found to be the best death inducer for *Pheretima posthuma*. The present evaluation study clearly indicated anthelmintic property of all the three Indian plants. Their candidature in *in-vivo* studies in near future can thus become a good step towards rationalization of herbal drugs.

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