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Anthelmintic activity of *Argemone mexicana* leaves extract against *Pheretima prosthuma* and *Ascaridia galli*

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ABSTRACT

Alcohol and aqueous extracts from the leaves of *Argemone mexicana* were investigated for their anthelmintic activity against *Pheretima posthuma* and *Ascaridia galli*. Five concentrations (6.25, 12.5, 25, 50 and 100 mg/ml) of each extracts were studied in activity, which involved the determination of time of paralysis and time of death of the worms. Both the extracts exhibited significant anthelmintic activity at highest concentration of 100 mg/ml. Piperazine citrate (10 mg/ml) was used as reference standard while normal saline served as a control. The anthelmintic activity of alcohol and aqueous leaves extracts of *A. mexicana* has therefore been demonstrated for the first time.

Keywords: Anthelmintic Activity, *Ascaridia Galli*, *Argemone mexicana*, *Pheretima Posthuma*, Piperazine citrate.

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INTRODUCTION

Helminthiasis, or worm infestation, is one of the most prevalent disease and one of the most serious public health problems in the world. Hundreds of millions if not billions of human infections by helminthes exist worldwide and increased world travel and immigration from the developing countries [1]. It produces a global burden of disease and contribute to the prevalence of malnutrition, anaemia, eosinophilia and pneumonia. People living in poverty in developing countries often suffer from helminth infections, which more often physically impair their hosts than kill them. Although the majority of infections due to worms are generally limited to tropical regions, they can occur to travelers who have visited those areas and some of them can develop in temperate climates [2].

Plants have been used from ancient times to cure diseases of man and animals. This system of therapy is commonly referred as 'unani, folk, eastern, or indigenous' medicine [3]. Medicinal plants are of great importance to the health of individuals and communities in general. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds. Many of the indigenous medicinal plants are used as spices and food plants. They also sometimes added to foods meant for pregnant women and nursing mothers for medicinal purposes [4, 5, 6].

The plant *Argemone mexicana* known as Ghamoya (Family papaveraceae) is an indigenous herb. It is a perennial herb growing to 0.6m by 0.45m. It is a prickly, glabrous, branching herb with yellow juice and showy yellow flowers. Leaves glaucous, oblongoblanceolate, pinnately lobed, 1/2-3/4 to midrib, both surfaces sparsely covered with prickles along veins, margins somewhat sinuate-dentate, the teeth tipped with a prickle, sessile, upper ones usually somewhat clasping the stem. The plant contains alkaloids as berberine, protopine, sarguinarine, optisine, chelerytherine etc. It is traditionally used as analgesic antispasmodic, antitussive, demulcent, emetic, expectorant, hallucinogenic, purgative, sedative, skin, warts [7]. In the present study we evaluated the potential Anthelmintic Activity of crude alcoholic and aqueous extract from the leaves of *A. mexicana* against *Pheretima Posthuma* and *Ascaridia Galli*.

MATERIALS AND METHODS

Plant material

The leaves of *A. mexicana* were collected from the river banks of Melvisharam, Vellore District, Tamil Nadu, India and authenticated by authority of Botany Department, C. Abdul Hakeem College, Melvisharam.

Preparation of Extract

Leaves were shade dried and powdered mechanically. The powdered plant material (500g) extracted with alcohol by soxhlet extraction process. The extract obtained was filtered and evaporated to dryness under reduced pressure in rotary evaporator. The aqueous extract was obtained by maceration for 24 hrs. The aqueous extract obtained was filtered and concentrated on hot plate.

Animals

Indian adult earthworms *P. posthuma* collected from moist soil and washed with normal saline to remove all faecal matter were used for the anthelmintic study. The earthworms of 4- 6 cm in length and 0.3-0.4 cm in width were used for all experimental protocol due to its anatomical and physiological resemblance with intestinal roundworms parasite of human beings [8]. *Ascaridia Galli* was obtained from intestine of freshly slaughtered fowls. Infested intestines of fowls were collected from the local slaughter house and washed with normal saline solution to remove all the faecal matter. These intestines were then dissected and worms were collected and kept in normal saline solution. Those worms were identified in Department of Zoology, C. Abdul Hakeem College, Melvisharam.

Anthelmintic Activity

Alcoholic and aqueous extract of *A. mexicana* leaves were investigated for their anthelmintic activity against *P. posthuma* and *A. Galli*. Various concentrations (6.25, 12.5, 25, 50 and 100 mg/ml) of each extracts were tested in the bioassay, which involved determination of time of paralysis and time of death of the worms. The anthelmintic assay was carried as per the method of Ajaiyeoba [9] with minor modifications. The assay was performed on adult Indian earthworm, *P. posthuma* due to its anatomical and physiological resemblance with the intestinal roundworm parasite of human beings [10, 11, 12]. Because of easy availability, earthworms have been used widely for the initial evaluation of anthelmintic compounds in vitro [13, 14, 15]. *P. posthuma* and *A. Galli* were divided into different groups, each group containing six worms. Fifty ml formulations containing five different concentrations of alcoholic and aqueous leaves extracts of *A. mexicana* (6.25, 12.5, 25, 50 and 100 mg/ml in normal saline) were prepared. Observations were made for the time taken to paralysis and death of individual worms. Time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Death was concluded when the worms lost their motility followed with fading away of their body colors. Piperazine citrate (10 mg/ml) was used as reference standard while normal saline served as a control. All the data obtained was presented as Mean \pm SEM.

RESULTS AND DISCUSSION

The results of present study demonstrated that, the alcoholic and aqueous extract of *A. mexicana* possess potent anthelmintic activity with different concentration. But the extract of *A. mexicana* showed highest activity, which is almost equal in effectiveness to standard Piperazine citrate. The difference in the time taken for induction of paralysis and death in both Piperazine citrate and high concentration of *A. mexicana* was insignificant or almost same. However, significant difference was observed when compared the induction of paralysis time and death of Piperazine with the lowest concentration of *A. mexicana* (Table 1). The mode of action for the piperazine is generally by paralysing parasites, which allows the host body to easily remove or expel the invading organism.

Table: 1 Anthelmintic activity of alcoholic and aqueous extracts of *A. mexicana* against *P. posthuma* and *A. Galli*

Treatment	Concentration (mg/ml)	Pheretima posthuma		Ascaridia galli	
		Time taken for paralysis (min)	Time taken for Death (min)	Time taken for paralysis (min)	Time taken for Death (min)
Control (Normal Saline)	-	-	-	-	-
Piperazine citrate (Standard)	10	17.8±0.08	39.7±0.14	23.5±0.11	41.3±0.47
Alcoholic leaves extract	6.25	97.2±0.54	0.00±0.00	121.7±0.12	0.00±0.00
	12.5	73.5±0.32	113.5±0.82	84.5±0.13	121.1±1.32
	25	46.5±0.61	81.2±0.59	61.8±0.18	92.3±0.15
	50	32.6±0.95	54.5±0.28	48.4±0.23	64.1±0.32
	100	18.1±0.52	43.6±0.91	34.4±0.87	48.5±0.92
Aqueous leaves extract	6.25	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
	12.5	126.5±0.14	135.5±0.62	133.5±0.11	149.5±0.62
	25	81.3±1.72	97.4±0.31	101.9±0.57	109.4±0.13
	50	43.9±0.23	71.9±0.32	75.4±0.63	81.7±0.43
	100	26.3±1.09	55.5±0.76	46.5±0.23	55.5±0.57

The perusal of the data reveals that the aqueous extract of *A. mexicana* did not show antihelmentic activity at a concentration of 6.25 mg/ml, whereas the alcoholic extract showed only paralysis but no mortality at similar concentration. The other test concentrations of both the extracts showed marked degree of antihelmentic activity.

The present study therefore reveals that the alcoholic extract was more potent than the aqueous extract, even though both the extracts were endowed with antihelmentic property. The activity reveals concentration dependent nature of the different extracts. Potency of the extracts was found to be inversely proportional to the time taken for paralysis/death of the worms. The plant is available along river banks in Tamil Nadu, it is predominantly present at Yercaud 1400m [16]. The plant is used mostly for the treatment of HIV [17]. The plant contains many alkaloids [17, 18] and was found to possess larvicidal and growth inhibiting activity against the second instar larvae of *Aedes aegypti* [19].



The above findings justify the antihelminthic activity of the *A. mexicana* which augments its use in the Ayurveda. Further studies regarding the isolation and characterization of the active principle responsible for antihelminthic properties are currently under process.

CONCLUSION

In conclusion, the results further support the view that some traditionally used Indian medicinal plants are important sources of potential antihelminthic activity and may be efficient as preventive agents in some diseases. The alcoholic and aqueous extract of *A. mexicana* showed antihelminthic properties on *P. posthuma* and *A. Galli*, might have a potential role as an alternative antihelminthic plant. Further study will be aimed at isolating and identifying the substances responsible for the antihelminthic activity of *A. mexicana* plant extracts.

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