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Anthelmintic activity on *Mirabilis jalapa* L., (Nyctaginaceae)

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Abstract

Mirabilis jalapa L. is distributed as an ornamental plant throughout the tropics of the world. The whole plant as well as individual parts is also used medicinally in Ayurveda, Siddha and other traditional system of medicine for curing various ailments. The literature survey reveals that *Mirabilis jalapa* L. is used to treat various types of diseases like gastrointestinal problems, intestinal pains, muscular pain, diarrhea, abdominal colic, constipation, genitourinary system disorders, helminthiasis etc. The present study is therefore aimed at validating one of the ethnomedicinal claims for its use as an anthelmintic. Preliminary phytochemical studies of the methanolic extract of leaves and aerial parts revealed presence of alkaloids, carbohydrates, tannins, flavonoids etc. The methanolic extract of leaves and aerial parts of *Mirabilis jalapa* L. has shown anthelmintic activity on earth worm *Pheritima posthuma* in a dose dependent manner. Concentration of 30 mg/ml has taken less time to cause paralysis, and little more time to cause death of earthworms which is comparable with Standard Drug Albendazole of 10 mg/ml concentration.

Keywords: *Mirabilis jalapa* L., (Nyctaginaceae), anthelmintic, albendazole

1. Introduction

Human being appears to be afflicted with more infections and diseases than any other animal species. Nature has provided a complete store-house of remedies to cure all ailments of mankind and its related diseases [1]. Helminthic infections are among the most common infections in human beings, affecting a large proportion of the world's population [2]. It has been estimated that about half of the world's population suffers from Helminthiasis and the number is increasing day by day. It is endemic in many regions because of poor sanitation, poor hygiene, malnutrition and crowded living condition. Nowadays potent anthelmintic are available and treatment can be given by using different types of drugs. However, the high costs of modern anthelmintic have limited effective control of the parasites and also generates resistance and hence causes reduction in use of anthelmintics. There are few plants which are being used traditionally as anthelmintic e.g. *Ocimum sanctum* L., *Mimusops elengi* L., *Melia azedarach* L., *Punica granatum* L., *Carica papaya* L. etc [1].

The use of plants for the treatment of Helminthiasis has gained popularity throughout the world. *Mirabilis jalapa* L. commonly known as Four O'clock plant (Nyctaginaceae) was officially botanically recorded in 1753 although it already had long been distributed as an ornamental plant throughout the tropics of the world. The whole plant as well as individual parts of *Mirabilis jalapa* L. are used traditionally to cure a variety of human ailments. Leaves and roots are used medicinally in Ayurveda, Siddha and other traditional system of medicine for curing various ailments [3]. In Ayurveda, it is known by the name "Gulambasa" [4]. The literature survey reveals that *Mirabilis jalapa* L. is used to treat various types of gastrointestinal problems, used to treat intestinal pains [5], muscular pain, diarrhea, abdominal colic [6]. Constipation [7], genitourinary system disorders, treating injuries [8], anti-dysenteric, anti-parasitic, carminative, digestive, stimulant, diuretic, purgative tonic, vermifuge etc [9]. Therefore, an attempt has been made to evaluate anthelmintic activity of methanolic extract of leaves of *Mirabilis jalapa* L. On adult earthworm *Pheritima posthuma*.

2. Materials and Methods

2.1. Plant material

The fresh leaves and aerial parts were collected from well grown plants during July-August and authenticated by Dr. K. Madhava Chetty, Department of Botany, Sri Venkateshwara University, Tirupati, Andhra Pradesh, India. The collected plant material was washed, shade dried and pulverized to coarse powder.

2.2. Chemicals and Reagents

The chemicals, solvents and reagents used in the study were standard analytical grade obtained from S.D Fine Chem Ltd., Mumbai and Loba Cheme, Mumbai.

2.3 Animals

Pheretima posthuma (Adult Indian earth worms) of about 5-7 cm long and 0.3-0.4 cm in width were used for the present study.

2.4 Standard Drug

Albendazole 400 mg. Tablet (Glaxo Smith Kline) used as the standard to compare the test results.

2.5. Preparation of extract

The dried powdered plant material was defatted with petroleum ether (40 – 60 °C) and then extracted with methanol using Soxhlet extractor. Following extraction, the methanol extract was concentrated under reduced pressure to yield dry solid residue (yield: 25.20 % w/w) [10, 11].

2.6. Phytochemical Screening

The crude extracts were subjected to qualitative tests for the identification of various active constituents. Phytochemical screenings were performed using standard procedures [12]. The results are depicted in Table No 1.

2.7. Determination of Anthelmintic Activity

Pheretima posthuma (Indian adult earth worms) of nearly equal size (6 cm. ± 1) were selected randomly for the present study. The worms were acclimatized to the laboratory conditions before experimentation. The earth worms were divided into seven groups of three earth worms in each.

Albendazole of 10 mg/ml concentration was prepared by diluting with distilled water which served as a standard. The test extract were prepared in varying concentrations of 10 mg/ml, 15 mg/ml, 20 mg/ml, 25 mg/ml, and 30 mg/ml with distilled water and poured in petri dishes. Normal saline served as control. Three earth worms nearly equal size 6 cm ± 1 were taken for each group and placed in petri dishes at room temperature. The time taken for complete paralysis and death were recorded. The mean paralysis time and mean lethal time for each sample was calculated. The time taken for the worms to become motionless was noted as paralysis time and Death was concluded when the worms lost their motility along with fading away of their body colour, and frequently applied with external stimuli which stimulates or induce movements in the earthworm, if alive [13].

3. Results

Table 1: Preliminary phytochemical studies of methanolic extract of *Mirabilis jalapa* L.

Constituents	Plant extract
Alkaloid	+
Carbohydrate	+
Protein	+
Glycosides	+
Flavonoids	+
Tannin	+
Steroids	+
Phenols	+

[‘+’=present]

Preliminary phytochemical studies of the extract revealed presence of alkaloids, carbohydrates, tannins, flavonoids etc.

Table 2: Anthelmintic Activity of Methanolic Extract of leaves and aerial parts of *Mirabilis jalapa* L.

Group Treatment Dose			Reaction time in (minutes)	
			Time taken for paralysis (min.)	Time taken for death (min.)
Control	Normal saline	-	-	-
Standard	Albendazole	10 mg/ml	15.35±0.16	23.75±1.12
Plant Extract	1	10 mg/ml	70.15±0.06	92.34±1.16
	2	15 mg/ml	55.45±1.16	75.96±0.24
	3	20 mg/ml	47.36±1.15	62.46±0.21
	4	25 mg/ml	31.28±0.22	41.85±1.14
	5	30 mg/ml	22.38±0.14	30.26±0.13

Results expressed as Mean ± SEM from three observations

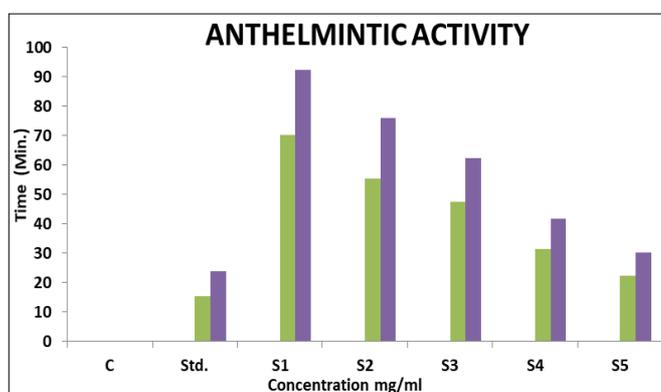


Fig 1: Values of Paralysis and death time of *Pheretima posthuma* [Indian adult earth worms] plotted against varying concentration of Methanolic Extract of leaves and aerial parts of *Mirabilis jalapa* L. compared with Standard (Albendazole 10 mg/ml).

C= Control,
Std. = Standard (Albendazole 10 mg/ml),
S1= 10 mg/ml
S2= 15 mg/ml
S3= 20 mg/ml
S4= 25 mg/ml
S5= 30 mg/ml

Methanolic extract of *Mirabilis jalapa* L.

■ Paralysis Time
■ Death Time

The methanolic extract of leaves and aerial parts of *Mirabilis jalapa* L. has shown anthelmintic activity in a dose dependent manner. The mean ± SEM values [statistical analysis] were calculated for the extract. The results of anthelmintic activity on earth worm *Pheretima posthuma* is given in Table 2. The study reveals that the different concentration of the extracts has shown paralysis and death of earthworms and it was compared with albendazole as standard drug.

4. Conclusion

From the above result it is concluded that methanolic extract of *Mirabilis jalapa* L. have a potent anthelmintic activity when compared with albendazole as standard drug. Further studies using in vivo model are required to find out and to establish effectiveness and pharmacological rationale for the use of leaves as well as aerial parts for its anthelmintic activity. Further studies to isolate active constituent from extracts to establish mechanism of action will also be beneficial. In this context it may be concluded that the present study will initiate further research work on this miracle plant *Mirabilis jalapa* L. which has many more potential ethnomedicinal claims to be scientifically validated. Concentration of 30 mg/ml has taken less time to cause paralysis, and little more time to cause death of earthworms which is comparable with Standard Drug.

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