



In vitro Anthelmintic Activity of Aerial Parts of *Aerva lanata* Linn Juss

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ABSTRACT

Methanol and aqueous extracts of *Aerva lanata* Linn Juss were taken for anthelmintic activity against Indian earthworm *Pheritima postuma*. Various concentrations of both extracts were tested and results were expressed in terms of time for paralysis and time taken for death of worms. Piperazine citrate (10 mg/ml) was used as reference standard and normal saline as a control group. Dose dependent activity was observed in both the extracts and the result shows that the methanol extract possesses more activity than aqueous extract and thus may be useful as an anthelmintic.

Keywords: Anthelmintic, *Aerva lanata* Linn Juss, Piperazine citrate.

INTRODUCTION

The World health Organisation (WHO) estimated that 80% of the population of developing countries rely on traditional medicines, mostly plant drugs for their primary health care needs. The use of medicinal plant is growing worldwide because of the increasing toxicity and allergic manifestations of the synthetic drugs. Helminth infections are among the most common infections in man, affecting a large proportion of the world's population. *Aerva lanata* Linn Juss (*Amaranthaceae*) is known as Polpala. The prostrate to decumbent, sometimes erect herb, 30-60 cm in height, woolly, tomentose through out. The plant is distributed throughout tropical India as a common weed in fields and wasteland and is also found to be grown in Arabia, Tropical Africa, Sri Lanka, Phillipine and Java. ^[1] It is commonly known as Chaya (Hindi), Sirupulai (Tamil) and Bhadra (Sanskrit). ^[2] In the traditional system of medicine, the plant was used as diuretic ^[3], anthelmintic ^[4], anti-inflammatory ^[5], diuretic ^[6], urolithiasis ^[7], nephro protective action in rats ^[8], antimicrobial activity and cytotoxicity of *Aerva lanata*. ^[9] The aerial parts of *Aerva lanata* used as anthelmintic traditionally. Literature survey reveals that there are no reports on systematic and scientific study of anthelmintic activity of has been reported, an attempt has been made to evaluate the anthelmintic potential of aerial parts of *Aerva lanata*.

MATERIALS AND METHODS

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Collection and authentication of plant material plant material

Fresh aerial parts of the plant *Aerva lanata* Linn Juss were collected from Tirunelveli district in Tamil Nadu, India during the month of November and it is identified and authenticated by Dr. Shiddamallayya N, Asst. Director Incharge from Regional Research Institute (AY), Bangalore and Voucher specimens (RRCBI- 5588) was deposited in the institute. The aerial parts of *Aerva lanata* Linn Juss were dried in the shade and it is milled into coarse powder by a mechanical grinder and it is stored in closed vessel for further use.

Drug and chemicals

The drug piperazine citrate (Glaxo Smithkline Pharmaceutical Ltd.) purchased from commercial sources and all other chemicals were of analytical grade.

Preparation of Extract

The air dried coarse powder of the aerial parts of *Aerva lanata* was extracted successively with organic solvents of increasing polarity like petroleum ether, chloroform, acetone and methanol using soxhlet's apparatus and water by maceration for 7 days. Each time before extracting with next solvent, the marc was dried in the air and it is then repacked in the apparatus. After each extraction was completed, the extracts were cooled at room temperature, filtered and concentrated under reduced pressure in the rotatory evaporator; it is then dried and kept in the desiccator. The extract of aerial parts of *Aerva lanata* were subjected to qualitative test for the identification of various active constituents

Anthelmintic activity

Anthelmintic activity was carried as per the method reported by Ajaiyeoba *et al* ^[10] with minor modifications. The assay

was performed on adult Indian earth worm *Pheritima postuma* due to its anatomical and physiological resemblance with the intestinal round worm parasite of human beings.^[11-13] Because of easy availability earthworm have been widely used for the initial evaluation of anthelmintic compounds *in vitro*.^[14-17] Fifty millilitres of formulation containing three different concentrations, each of crude methanolic and aqueous extracts (25, 50, 100 mg/ ml in Tween 80/normal saline). This was done in duplicate for both the extracts. All the extracts and the standard drug solution were freshly prepared before starting the experiments. Mean time for paralysis (in min) was noted when no movement of any sort could be observed except when the worm was shaken vigorously; time for death of worms (in min) was recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water (50°C). Piperazine citrate (15 mg/ml) was used as reference standard.^[18]

Table I: Anthelmintic activity of methanolic and aqueous extracts of aerial parts of *Aerva lanata* Linn Juss

Treatment Drug	Concentration used	Time taken for Paralysis (min)	Time taken for Death (min)
Piperazine citrate	15 mg/ ml	14.16 ± 0.6009	31.83 ± 0.6540
Methanol extract	25 mg/ ml	26.66 ± 0.4944	34.83 ± 0.6009
Methanol extract	50 mg/ ml	18.83 ± 0.7031	22.33± 0.5577
Methanol extract	100 mg/ ml	7.5 ± 0.5627	11.16 ± 0.4772
Aqueous extract	25 mg/ ml	32.5 ± 0.6191	40.33 ± 0.8432
Aqueous extract	50 mg/ ml	24.83 ± 0.7923	28 ± 0.7745
Aqueous extract	100 mg/ ml	13.83 ± 0.6540	18 ± 0.6831

Values are expressed as mean ± SEM (n=6)

RESULTS AND DISCUSSION

Preliminary phytochemical studies on *Aerva lanata* revealed the presence of flavanoid glycosides, steroids, carbohydrates, alkaloids, tannins, proteins and flavanoids. Some of these phytoconstituents may be responsible to show a potent anthelmintic activity. From the result both methanolic and aqueous extract of the aerial parts of *Aerva lanata* show an anthelmintic activity when compared to the standard drug. Each crude extract at the concentration of 25, 50 and 100 mg/ ml produced anthelmintic activity in dose dependent manner giving shortest time of paralysis (P) and death (D) with 100 mg/ml concentration. Methanolic extract of aerial parts of *Aerva lanata* at concentration of 100 mg/ ml caused paralysis in 7.5 min and death in 11.16 min, while aqueous extract showed paralysis in 13.83 min and death in 18 min against *Pheritima postuma*. The reference drug piperazine citrate showed the same at 14.16 min and 31.83 min respectively. The predominant effect of piperazine citrate on the worm is to cause a flaccid paralysis that result in expulsion of the worm by peristalsis. piperazine citrate by increasing chloride ion conductance of worm muscle membrane produces hyper polarisation and reduced excitability that leads to muscle relaxation and flaccid paralysis.^[19] Phytochemical analysis of the crude extracts revealed the presence of tannins as one of the chemical constituents. Tannins were shown to produce anthelmintic activities.^[20] Chemically tannins are polyphenolic compounds.^[21] Some synthetic phenolic anthelmintics (eg) niclosamide, oxcyclozanide and bithionol

are shown to interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation.^[22] It is possible that tannins contained in the extracts of *Aerva lanata* produced similar effects. Another possible anthelmintic effect of tannins is that they can bind to free proteins in the gastro intestinal tract of host animal^[23] or glycoprotein on the cuticle of the parasite^[24] and cause death.

In conclusion, the traditional claim of aerial parts of *Aerva lanata* as an anthelmintic has been confirmed as the extracts shown activity against *Pheritima postuma*. Further studies are necessary to isolate and reveal the active compound contained in the crude extracts of *Aerva lanata* responsible for activity and to establish the mechanism of action are required.

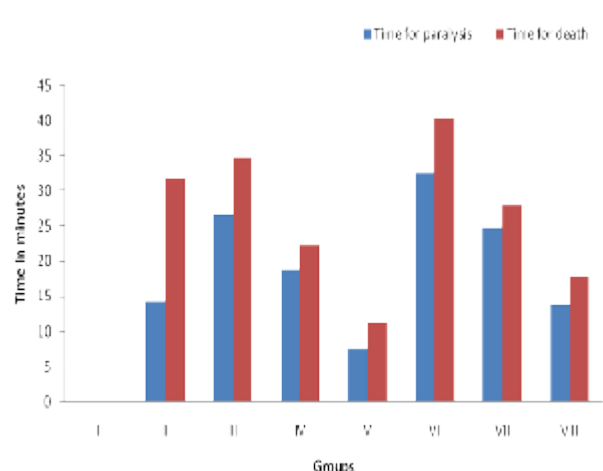


Fig. 1: Anthelmintic activity of methanol and aqueous extracts of aerial parts of *Aerva lanata* Linn Juss on *Pheretima postuma*.

Group I- Control(Normal saline), group II- standard (Piperazine citrate),group III to V- Methanolic extract of dose 25, 50, 100 mg/ ml respectively and group VI to VIII- Aqueous extract of dose 25, 50, 100 mg/ ml respectively.

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