Available online at www.ijpsdr.com
International Journal of Pharmaceutical Sciences and Drug Research 2010; 2(4): 269-271

Research Article ISSN 0975-248X

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

Rajesh R[1*], Chitra K[2], Padmaa M. Paarakh[3]

[1]*Dept of Pharmaceutical Chemistry, The Oxford College of Pharmacy, Hongasandra, Bangalore- 68, Karnataka, India*
[2]*Sri Ramachandra College of Pharmacy, Sri Ramachandra University, Porur, Chennai- 600116, Tamil Nadu, India*
[3]*Dept of Pharmacognosy, The Oxford College of Pharmacy, Hongasandra, Bangalore- 68, Karnataka, India*

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, wolly, 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

***Corresponding author: Mr. Rajesh R,**
Dept of Pharmaceutical Chemistry, The Oxford College of Pharmacy, Hongasandra, Bangalore- 68, Karnataka, India;
E-mail: rajeshsrn@gmail.com

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 posthuma* 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, oxyclozanide 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.

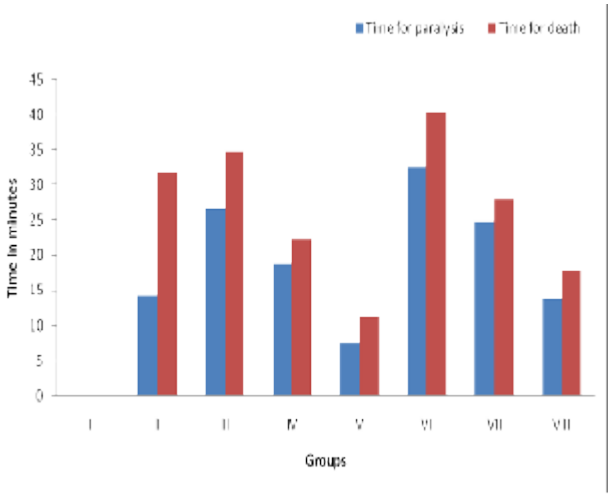

Fig. I: Anthelmintic activity of methanol and aqueous extracts of aerial parts of *Aerva lanata* Linn Juss on *Pheretima postuma*.

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.

ACKNOWLEDGEMENT

The authors are grateful to Chairman and Executive Director, Children's Education Society, Bangalore, Karnataka for providing all the facilities to conduct this work.

REFERENCES

1. Krishnamurthi A. The wealth of India. Vol. I, CSIR, New Delhi, 2003, pp. 92.
2. Guha Bakshi DN, Sen Sarma P, Pal DC. A Lexicon of Medicinal plants in India, Vol. I, 1999, pp. 61- 62.
3. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plants, CSIR, New- Delhi, 1956, pp. 550.
4. Sankaran S, Alagesaboopathi C. Some Medicinal Plants used by the tribals of Shervaroy hills, Tamil Nadu. Flora Fauna 1995; 1:137-138.
5. Vetrichelvan T, Jegadeesan M, Senthil Palaniappan S, Murali NP, Sasikumar K. Diuretic and anti inflammatory activities of *Aerva lanata* in rats. Indian J Pharm Sci 2000; 62:300-302.
6. Udupihille M, Jiffry MTM. Diuretic effect of *Aerva lanata* with water, normal saline and coriander as controls. Indian J Physiol and Pharmacol 1986; 30:91-97.
7. Rao SG. Evaluation of an experimental model for studying urolithiasis effect of *Aerva lanata* on urinary stones. Indian Drugs 1985; 22:640-643.
8. Shirwaikar A, Issac D, Malini S. Effect of *Aerva lanata* on cisplatin and gentamycin models of acute renal failure. J Ethno Pharmacol 2004; 90:81-86.
9. Dulaly C. Antimicrobial activity and cytotoxicity of *Aerva lanata*. Fitoterapia 2002; 73:92-94.

10. Ajaiyeoba EO, Onocha PA, Olarenwaju OT. *Invitro* anthelmintic properties of *Buchholzia coriaceae* and *Gynandropsis gynandra* extract. Pharm Biol 2001; 39:217- 220.
11. Vidyarthi RD. A Text Book of Zoology. Edn 14, S.Chand and Co, New Delhi, 1967, pp. 329.
12. Thorn GW, Adams RD, Braunwald E, Issel bacher KJ, Petersdonf RG. Harrison's Principles of Internal Medicine.Mc Graw Hill Co, New York, 1977, pp. 1088.
13. Vigar Z. Atlas of Medical Parasitology. Edn 2, PG Publishing house, Singapore, 1984, pp. 216.
14. Sollmann T. Anthelmintics: their efficiency as tested on earth worms. J Pharmacol Exp Ther 1918; 112:129-170.
15. Jain ML, Jain SR. Therapeutic utility of *Ocimum basilicum var album*. Plant Med 1972; 22:66-70.
16. Dash GK, Suresh P, Kar DM, Ganpaty S, Panda SB. Evaluation of *Evolvulus alsinoids* Linn for anthelmintic and antimicrobial activities. J Nat Rem 2002; 2 :182-185.
17. Shivkar YM, Kumar VL. Anthelmintic activity of latex of *Calotropis procera*. Pharma Biol 2003; 41:263-65.
18. Mali RG, Shailaja M, Patil KS. Anthelmintic activity of root bark of *Capparis spinosa*. Indian J Nat Prod 2005; 21:50-51.
19. Martin RJ. γ-amino butyric acid and piperazine activated single channel current from Ascaris suum body muscle. Br J Pharmacol 1985; 84:445-461.
20. Niezen JH, Waghorn GC, Charleston WAG. Growth and gastro intestinal nematode parasitism in lamps grazing either Lucerne (*Medicago sativa*) or sulla (*hedysarum coronarium*), which contains condensed tannins. J Agri Sci 1995; 125:281-289.
21. Bate smith EC. The Phenolic constituent of plants and their taxonomic significance, dicotyledons. J Linn Soc Bot 1962; 58:95-103.
22. Martin RJ. Mode of action of anthelmintic drugs. Vet J 1997; 154:11-34.
23. Athnasiadou S, Kyriazakis I, Jackson F, Coop RL. Direct anthelmintic effects of condensed tannins towards different gastro intestinal nematodes of sheep: In vitro and in vivo studies. Vet Parasitol 2001; 99:205-219.
24. Thompson DP, Geary TG. The structure and function of helminth surfaces. In: Marr JJ Editor. Biochemistry and Molecular Biology of Parasites. 1st ed. Academic Press, New York, 1995, pp. 203-32.