Iranian Journal of Pharmaceutical Research (2006) 4: 281-284
Received: April 2005
Accepted: October 2005

Original Article

In Vitro Antihelmintic Property of Various Seed Oils

Sunil S. Jalalpure[a*], Kallanagoda R. Alagawadi[a], Channabasappa S. Mahajanshetty[a], Mahmad Salahuddin[b] and Biren Shah[b]

[a]*Department of Pharmaceutical Chemistry, KLES's College of Pharmacy, Belguam-590 010, Karnataka, India.* [b]*Department of Pharmacognosy and Phytochemistry, KLES's College of Pharmacy, Belguam-590 010, Karnataka, India.*

Abstract

Seed oils of *Passiflora edulis, Jatropa curucas, Tinospora cordifolia, Sesbania grandiflora* and *Sapindus laurifolia* were investigated for their antihelmintic property against *Pheritima pasthuma*. Three concentrations (10, 50 and 100 mg/ml) of each oil were studied in the bioassay, which involved the determination of time of paralysis and time of death of the worm. *Sesbania grandiflora* showed the highly significant antihelmintic activity in both the parameters (paralysis and death), while *Tinospora cordifolia* showed significant effect in case of time of death. Piperazine citrate (10 mg/ml) was included in the assay as standard reference drug.

Keywords: Antihelmintic; *Pheritima pasthuma*; Seed oils; Piperazine citrate.

Introduction

Diseases caused by helminth parasites in livestock continue to be a major productivity constraint, especially in small ruminants in the tropics and subtropics (1). In the developing countries, with the exception of those countries in the southern hemisphere, the greatest impact is probably found in the costs of control, particularly in the case of the helminth parasitoses. In the Developing countries, the greatest impact of parasitic diseases is in direct and potential productivity losses (2).

Many researches show that some plants not only affect the nutrition of animals, but also have antiparasitic effects (3). For example, plants that contain condensed tannins, a class of phenolic secondary metabolites, have these effects.

Oil of chenopodium (frequently combined with a laxative) derived from *Chenopodium ambrosioides* (4), has been used for many years in the United Kingdom and United States to treat nematode parasite infections (*Strongylus, Parascaris* and *Ascaris* spp.) in monogastric animals including humans (5). Embelin extracted from *Embelia schimperi*, has been evaluated *in vivo* in mice and rats infected with the cestodes *Hymenolepis microstoma* and *H. diminuta,* and mice infected with the trematode *Echinostoma caproni,* and the nematode *Heligmosomoides polygyrus* (6).

Passiflora edulis (Passifloraceae), a large genus of herbaceous or woody tendril climbers, is mostly distributed in tropical and subtropical America, a few in tropical Asia, Australia and Polynesia. It is a woody climber, native of Brazil, now cultivated in all parts of the world, chiefly

* Corresponding author:
E-mail: jalalpuresunil@rediffmail.com

for its edible fruits and for its ornamental flowers (7). The pulp of fruit of *Passiflora edulis* is used in Brazil as a stimulant and strong analgesic (8). The fruits are said to be emetic and a decoction of them is used for asthma and biliousness. The leaves are used as dressing for wounds, and a decoction of them and roots is said to be an emmenagogue and useful in hysteria. The plant is used for curing itches (7).

Jatropha curcas Linn., a large shrub, 3-4 m in high, native of tropical America, occurring almost through out India and in Andaman Islands (9). The seeds of *Jatropha curcas* are powerful p urgative, acrid, sweet, aphrodisiac, thermogenic, digestive, tonic, anthelmintic and depurative. They are useful in haemorrhoids, wounds, splenomegaly and skin diseases. The yellow oil obtained from roots has a strong anthelmintic action. The oil from the seeds possesses purgative properties and is used externally in rheumatism and paralytic affections (10).

Tinospor cordifolia Willd. (Menispermaceae) is found throughout tropical India, ascending to an altitude of 300 m. A large glabrous climbing shrub. Stems rather succulent with long filiform, aerial roots arising from branches, seeds curved (11). *Tinospora cordifolia* stem is used as bitter, astringent, anthelmintic, antiinflamation, antipyretic, antiemetic and cardiotonic (12). The active principles and juice of the fresh plant possess a number of pharmacological activities. It is bitter, stomachic, antiperiodic, and aphrodisiac. It is useful in chronic diarrhoea, to remove urinary stones (Calculi), as a diuretic, CNS depressant, hypoglycaemic, antibacterial, antipyretic, anti-inflammatory, anti-rheumatic, antiallergic, analgesic, hepatoprotective and reduces blood urea (13).

Sesbenia grandiflora Linn. (Fabaceae) is a short-lived, quick-growing, soft-wooded tree, 6-9 m high and 0.6 m in girth. It is a native of Malaysia and is grown in many parts of India such as Punjab, Dehli, Bengal, Assam and the Andaman (14). The bark of *Sesbania grandiflora* possesses astringent, cooling bitter tonic, and anthelmintic and antipyretic properties (15). Leaves are poulticed onto rheumatic bruises. Swellings are poulticed or rubbed with aqueous decoctions of the powdered roots of *Sesbania grandiflora*. The fruits are believed to be laxative and stimulant. It has also been used in treatment of anaemia, bronchitis, fever, pain, thirst and tumours. The root is used for inflammation, the bark is astringent; leaves are alexeteric, anthelmintic and used for epilepsy, gout, itch and leprosy (16). The leaf is tonic and antipyretic and cures night blindness (17).

Sapindus lauriflora Vahl (Sapindaceae) is a native of South India where it is common on the coast and in the open forests at low elevations. It is good avenue tree and is occasionally cultivated around villages in West Bengal, Bihar, Madhya Pradesh and Uttar Pradesh. The tree thrives well in almost any kind of soil, but, loamy, clay, and black-cotton soils are more favourable (18). The fruits of *Sapindus laurifolia* are acrid bitter, emetic, astringent, anthelmintic, abortifacient and tonic (19). Pessaries made of kernel of the seed are used to stimulate the uterus in child-birth and amenorrhoea. The pulp of the fruit is used as anthelmintic. The bark is astringent (20).

In the present study, seeds of all above plants were collected carefully in the right season from a village Tukkanhatti, Belgaum, Karnataka, India. Botanist Dr A.V. Kulkarni, from, Dept. of Botany, GSS science institute, Belgaum, has authenticated all the plants.

Experimental

Seeds were dried at room temperature until they were free from moisture, powdered, extracted with petroleum ether (40-60ºC) to get seed oils and were subjected to the evaluation of anthelmintic activity.

Pheritimia pasthuma was collected from the water logged areas from the forte lake in Belgaum, Karnataka, India. Doses of oil samples were randomly selected as 10, 50 and 100 mg/ml of Tween 80 (2%) suspension and the dose of standard was 10 mg/ml.

Pheritimia pasthuma was placed in nine cm. Petri dish in three different concentrations of oils (10, 50 and 100 mg/ml). This was done in duplicate for all the oils. Mean times for paralysis (P, in min) were taken when no movement of any sort could be observed, except when the worm was shaken vigorously; times of death of worm (D, in min) were recorded after ascertaining that worms neither moved when shaken vigorously

nor when dipped in warm water (50ºC). Piperazine citrate (10 mg/ml) was included as reference compound. The result has been shown in Table.

Statistical analysis

Statistical comparisons between groups were performed using ANOVA and comparisons between mean values were made by using Null hypotheses to test significance with $p < 0.05$.

Results and Discussion

Yield (%) of oils and the result of the antihelmintic studies of oils are presented in Table 1. In case of *Sesbenia grandiflora* and *Tinospora cordifolia* oil samples tested at concentrations 10, 50 and 100 mg/ml displayed intrinsic antihelmintic properties. The extracts showed concentration related antihelmintic activity with the worm used in the study, with 100 mg/ml giving the shortest time of paralysis (P) and death (D) for the selected worm.

Earthworm selected for the antihelmintic activity was most sensitive to the oil of *Sesbenia grandiflora* as shown in Table 1. It produces the paralysis in 1 min and time of death is 30 min. Earthworm also showed the sensitivity to the oil of *Tinospora cordifolia*. Worms did not show any sensitivity to the paralizing effect of the oil, but are more sensitive for death as time for earthworm to die with *Tinospora cordifolia* oil was 29 min as compared to the time of standard 41 min. In other words, earthworm took shorter time to die with the oil of *Tinospora cordifolia* than the time taken by the worm to die with standard.

Even though the worm did not show sensitivity to the paralizing effect of the oil sample of *Jatropha curcas*, but it took 42 min for the worm to die. With *Jatropha curcas* oil while the time taken by the worm to die with the standard was 41 min.

The earthworms were more sensitive to the extracts of *Sesbenia grandiflora* and *Tinospora cordifolia* at concentration 100 mg/ml as compared to the reference drug Piperazine citrate (10 mg/ml). Both the extracts were more effective in causing death of worm and effective in causing paralysis.

The function of most worm expellers like Piperazine citrate is to cause paralysis of worms such that they are expelled in the faeces of man and animals. The extracts of *Sesbenia grandiflora*

Table 1. Effect of different concentrations of various seed oils on *Pheritimia pasthuma*

SL. No.	Groups	Oil yield (%)	Concentration mg/ ml	Time of Paralysis (P) and Death (D) of *Pheritimia pasthuma* in min (± SEM)	
				P	D
1	Piperazine citrate	-	10	1.6 ± 0.06	41 ± 0.006
2	*Sapindus laurifoliatus*	40.00	10	49 ± 0.12	73 ± 0.44
			50	41± 0.19	62 ± 0.17
			100	33 ± 0.12	51 ± 0.42
3	*Sesbenia grandiflora*	11.00	10	2.5 ± 0.06 ^{b}	40 ± 0.07 ^{b}
			50	1.9 ± 0.01 ^{b}	38 ± 0.16 ^{b}
			100	1.1 ± 0.21 ^{b}	30 ± 0.16 ^{b}
4	*Passiflora edulis*	22.50	10	49 ± 0.12	77 ± 0.12
			50	42 ± 0.05	65 ± 0.06
			100	39 ± 0.01	59 ± 0.07
5	*Jatropa curcas*	42.00	10	39 ± 0.12	69 ± 0.01
			50	29 ± 0.01	59 ± 0.02
			100	20 ± 0.02	42 ± 0.06
6	*Tinospora cordifolia*	24.00	10	25 ± 0.13	41 ± 0.6 ^{a}
			50	21 ± 0.25	32 ± 0.1 ^{a}
			100	19 ± 0.30	29 ± 0.1 ^{a}

$p < 0.05$ = Significant ^{a}
$p < 0.01$ = Highly Significant ^{b}

and *Tinospora cordifolia* not only demonstrated this property, they also caused death of the worms, especially at 100 mg/ml.

In conclusion, the traditional uses of the plants *Sesbenia grandiflora* and *Tinospora cordifolia* having antihelmintic properties (14, 17) have been confirmed, as oils displayed antihelmintic properties against *Pheritimia pasthuma* worm.

References

1) Perry BD, Randolph TF, McDermott JJ, Sones KR and Thornton PK. *Investing in Animal Health Research to Alleviate Poverty*. International Livestock Research Institute (ILRI), Nairobi (2002) 148 -149
(2) Perry BD and Randolph TF. Improving the assessment of the economic impact of parasitic diseases and of their control in production animals. *Veterinary Parasitology* (1999) 84: 145-168
(3) Waghorn GC and McNabb WC. Consequences of plant phenolic compounds for productivity and health of ruminants. *Proceedings of the Nutrition Society* (2003) 62: 383-392
(4) de Bairacli Levy J. *The Complete Herbal Handbook for Farm and Stable*. 4th ed. Faber and Faber, London (1991) 471
(5) Gibson TE. *Veterinary Anthelmintic Medication.* 2nd ed. Technical Communication No. 33 of the Commonwealth Bureau of Helminthology, St. Albans (1965) 206
(6) Bogh HO, Andreassen J and Lemmich J. Anthelmintic usage of extracts of *Embelia schimperi* from Tanzania. *J. Ethnopharmacol.* (1996) 50: 35-42
(7) The Wealth of *India. A Dictionary of Indian Raw Materials and Industrial Products.* CSIR, New Delhi (1966) 273-278
(8) Kirtikar KR and Basu BD. *Indian Medicinal Plants.* Vol-II, 2nd ed. Lalit Mohan Basu, Allahabad, India (1999) 1103- 04
(9) The Wealth of India. *A Dictionary of Indian Raw Materials and Industrial Products*. CSIR, New Delhi (1985) 293-294
(10) Vaidyaratnam PSV. *Indian Medicinal Plants, A Compendium of 500 Species.* Vol. III, Orient Longman, Madras, India (1995) 261-263
(11) Chatterjee A. *The Treatise of Indian Medicinal Plants.* Vol I, Publication and Information Directorate, New Delhi (1994) 136-137
(12) Vaidyaratnam PSV. *Indian Medicinal Plants, A Compendium of 500 Species.* Vol. V, Orient Longman, Madras, India (1996) 283-284
(13) Hakeem Hasmi, Herbal raw materials, 25/12/2004, www.unaniherbalist.com
(14) The Wealth of India. *A Dictionary of Indian Raw Materials and Industrial Products.* CSIR, New Delhi (1985) 295-296
(15) Vaidyaratnam PSV. *Indian Medicinal Plants, A Compendium of 500 Species.* Vol. V, Orient Longman, Madras, India (1996) 117-118
(16) James A. Duke. Handbook of Energy Crops. Unpublished. January 9, 1998.www.hort.purdue.edu/newcrop/duke_energy/Sesbania_grandiflora.html
(17) Kirtikar KR and Basu BD. *Indian Medicinal Plants*. Vol-I, 2nd ed. (1999) 735-737
(18) Joshi C.G and Magar NG. Antibiotic activity of some indian medicinal plants.. *Sci. Industr. Res.* (1952) 11: 261
(19) Vaidyaratnam PSV. *Indian Medicinal Plants, A Compendium of 500 Species*. Vol. V, Orient Longman, Madras, India (1996) 63
(20) Gupta SK and Kharya M. Phytochemical and pharmacological studies on seeds of Sapindus
(21) laurifoliatus. Indian journal of natural products (1996) 12 (1): 3-5.
Prashanth D, Asha MK, Amit A and Padmaja
(22) R. Anthelmintic activity of *Butea monosperma. Fitoterapia* (2001) 72: 421-422
Ajaiyeoba EO, Onocha PA and Olarenwaju OT. *In vitro* anthelmintic properties of *Buchholzia coriaceae* and *Gynandropsis gynandra* extracts. *Pharm. Biol.* (2001) 39: 217-220

This article is available online at http://www.ijpr-online.com