



IN VITRO ANTHELMINTIC ACTIVITY OF WHOLE PLANT EXTRACTS OF *HYPTIS SUAVEOLENS* POIT

PRAVEEN S. NAYAK*¹, SHWETA NAYAK¹, DM KAR², P. DAS¹

¹GRY Institute of Pharmacy Borawan, Khargone M.P, ²School of Pharmaceutical Sciences SOA University, Bhubaneswar

E mail: praveen_nayak2000@yahoo.com

Received 16 Dec 2009, Revised and Accepted 04 Jan 2010

ABSTRACT

The plant *Hyptis suaveolens* poit commonly known as Wilayati tulsii belongs to the family of Labiata found everywhere in the country. A tall course, branched and very sweet smelling. Almost all parts of this plant are being used in traditional medicine to treat various diseases. Alcohol and aqueous extracts from whole plant of *Hyptis suaveolens* were investigated for their anthelmintic activity against *Pheretima posthuma* and *Ascaridia galli*. Three concentrations (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 worm. Both the extracts exhibited significant anthelmintic activity at highest concentration of 100 mg/ml. Piperazine citrate in same concentration as that of extract was included as standard reference and distilled water as control. The anthelmintic activity of alcohol and aqueous extracts of *Hyptis suaveolens* has therefore been demonstrated for the first time.

Keywords: Anthelmintic Activity, *Ascaridia Gallii*, *Hyptis suaveolens*, *Pheretima Posthuma*.

INTRODUCTION

The plant, *Hyptis suaveolens* (L) Poit commonly known as *Wilayati tulsii* belongs to the family Lamiaceae and is an ethnobotanically important medicinal plant. The plant has been considered as an obnoxious weed, distributed throughout the tropics and subtropics. Almost all parts of this plant are being used in traditional medicine to treat various diseases. The leaves of *H. suaveolens* have been utilized as a stimulant, carminative, sudorific, galactagogue and as a cure for parasitic cutaneous diseases¹. *Hyptis suaveolens* (L.) Poit. Is a plant belonging to family Lamiaceae, or the Mint family. It is a family of plants of about 210 genera and some 3,500 species. The original family name is Labiatae, so given because the flowers typically have petals fused into an upper lip and a lower lip. Although this is still considered an acceptable alternate name, most botanists now use the name "Lamiaceae" in referring to this family. They are herbs or undershrubs, distributed over both hemispheres and includes a number of medicinal and sub-medicinal plants of great value².

Hyptis suaveolens is used traditionally for the treatment of respiratory track infections, colds, pain, fever, cramps and skin diseases³. The aerial parts have yielded the ring Acontracted triterpenoid hyptadienic acid⁴. An acidic polysaccharide has been reported from the seed-coat mucilage⁵ The wide variety of essential oils isolated from the leaves^{6,7,8} have been extensively investigated for antifungal^{9,10} antibacterial¹¹ and anticonvulsant¹² activities.

MATERIAL AND METHODS

Plant collection and identification

The flowering whole plants were collected from the fields around the road side area of Maheshwar, distt Khargon M.P. India, during the months of September - October and the identification of plant was done by Prof. P. Patidar, Govt P.G College, Botany department Khargone M.P. India. A specimen was vouchered, and deposited at GRY Institute of Pharmacy, Borawan Khargon M.P. India

Extraction

Fresh plant, after collection was shade dried, defatted with hexane and then extracted with ethanol by Soxhlet apparatus. Aqueous extract were obtained by maceration for 24 hours.

Experiment

Alcohol and aqueous extracts of the whole plant of *hyptis suaveolens* were investigated for their anthelmintic activity against *Pheretima*

posthuma and *Ascaridia galli*. Various concentrations (10-100 mg/ml) of each extract were tested in the bioassay, which involved determination of time of paralysis and time of death of the worms. Piperazine citrate was included as standard reference and distilled water as control. The anthelmintic assay was carried as per the method of Ajaiyeoba et al.¹³ with minor modifications.

The assay was performed on adult Indian earthworm, *Pheretima posthuma* due to its anatomical and physiological resemblance with the intestinal roundworm parasite of human beings^{14,15,16,17} Because of easy availability, earthworms have been used widely for the initial evaluation of anthelmintic compounds in vitro^{18,19,20,21,22}.

Indian adult earthworms (*Pheretima posthuma*) collected from moist soil and washed with normal saline to remove all faecal matter were used for the anthelmintic study. The earthworms of 3-5 cm in length and 0.1-0.2 cm in width were used for all the experimental protocol. *Ascaridia galli* worms are easily available in plenty from freshly slaughtered fowls and their use, as a suitable model for screening of anthelmintic drug was advocated earlier (25,25,27). In the first set of experiment, six groups of six earthworms were released in to 50 ml of solutions of piperazine citrate, aqueous and alcoholic whole plant extracts of *hyptis suaveolens* (25, 50 and 100 mg/ml each) in distilled water. Piperazine citrate was used as reference standard while distilled water as control.

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. Same experiment was done for *Ascaridia galli* worms only the difference was solutions were prepared in normal saline solutions.

RESULTS AND DISCUSSION

Preliminary phytochemical screening of alcoholic extract revealed the presence of anthraquinone glycosides, phenolic compounds and steroids while aqueous extract showed presence of glycosides and phenolic compounds. From the results shown in table no. 1, 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 hyperpolarisation and reduced excitability that leads to muscle relaxation and flaccid paralysis.

Table 1: Anthelmintic activity of extracts of *hyptis suaveolens*

Extracts	Concentration in mg/ml	Pheretima posthuma		Ascaridia galli	
		P	D	P	D
Aqueous extract	25	89.03± 0.4	118.21± 0.6	53.15 ± 0.76	70.5 ± 0.34
	50	72± 0.3	101.98± 0.1	46.2 ± 0.21	60.2 ± 0.11
	100	64.73± 0.8	85.63± 0.1	27.5 ± 0.18	42.5 ± 0.48
Alcoholic extract	25	65± 0.14	72± 0.44	64.04 ± 0.9	79.5 ± 0.23
	50	43± 0.21	66± 0.11	49.7 ± 0.1	68.2 ± 0.1
	100	23± 0.9	33± 0.45	34.2 ± 0.6	45.75 ± 0.23
Piperazine citrate	25	1.5 ± 0.7	54.5 ± 0.4	41.23 ± 0.14	54.5 ± 0.4
	50	0.9 ± 0.12	30.2 ± 0.1	29.75 ± 0.5	30.2 ± 0.1
	100	0.5 ± 0.17	18.5 ± 0.8	20.05 ± 0.9	23.5 ± 0.8
Control	--	--	--	--	--

P: Time taken for Paralysis (min), D: Time taken for Death of worms (min)

The alcoholic extract of *hyptis suaveolens* demonstrated paralysis as well as death of worms in a less time as compared to piperazine citrate especially at higher concentration of 100 mg/ml. While water extract also shown significant activity. Phytochemical analysis of the crude extracts revealed presence of flavonoids as one of the chemical constituent. Polyphenolic compounds show anthelmintic activity²³. Some synthetic phenolic anthelmintics e.g. niclosamide, oxclozanide and bithionol are shown to interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation²⁴. It is possible that phenolic content in the extracts of *hyptis suaveolens* produced similar effects.

REFERENCES

- The Wealth of India (Raw Materials), Vol. V, CSIR, New Delhi, 1964:159.
- Peerzada N. Chemical composition of the Essential oil of *Hyptis suaveolens*. *Molecules*. 1997; 2: 165-168.
- Iwu, M.M. Hand book of African medicinal plants. CRC Press Inc., Boca Raton, USA 1993.
- Raja Rao, K.V., Rao, L.J.M., Prakasa Rao, N.S. An A-ring contracted triterpenoid from *Hyptis suaveolens*. *Phytochemistry* 1990; 29, 1326-1329.
- Aspinall, G.O., Gapek, P., Carpenter, R.C., Gowda, D.C., Szafrank, J., A novel 1-fuco-4-O-methyl-d-glucurono-d-xylan from *Hyptis suaveolens*. *Carbohydrate Research* 1991; 214, 107-113.
- Zollo, P.H.A., Biyiti, L., Tchoumboungang, F., Menut, C., Lamaty, G., Bouchet, P., Aromatic plants of tropical central Africa. Part XXXII. Chemical composition and antifungal activity of thirteen essential oils from aromatic plants of Cameroon. *Flavour and Fragrance Journal* 1998; 13, 107-114.
- Malele, R.S., Mutayabarwa, C.K., Mwangi, J.W., Thoithi, G.N., Lopez, A.G., Lucini, E.I., Zygadlo, J.A., Essential oil of *Hyptis suaveolens* (L.) Poit. from Tanzania: composition and antifungal activity. *Journal of Essential Oil Research* 2003; 15, 438-440.
- Azevedo, N.R., Campos, I.F.P., Ferreira, D.H., Portes, T.A., Santos, S.C., Seraphin, J.C., Paula, J.R., Ferri, P.H., Chemical variability in the essential oil of *Hyptis suaveolens*. *Phytochemistry* 2001; 57, 733-736.
- Pandey, D.K., Tripathi, N.N., Tripathi, R.D., Dixit, S.N., Fungitoxic and phytotoxic properties of the essential oil of *Hyptis suaveolens*. *Journal of Plant Diseases and Protection* 1982; 89, 344-349.
- Singh, G., Upadhyay, R.K., Rao, G.P., Fungitoxic activity of the volatile oil of *Hyptis suaveolens*. *Fitoterapia* 1992; 63, 462-465.
- Asekun, O.T., Ekundayo, O., Adeniyi, B.A., Antimicrobial activity of the essential oil of *Hyptis suaveolens* leaves. *Fitoterapia* 1999; 70, 440-442.
- Akah, P.A., Nwambie, A.I., Nigerian plants with anticonvulsant properties. *Fitoterapia* 1993; 64, 42-44.
- Ajaiyeoba E.O., Onocha PA, Olarenwaju OT. In vitro anthelmintic properties of *Buchholzia coriacea* and *Gynandropsis gynandra* extract. *Pharm Biol* 2001 39:217-20.
- Vidyarathi R.D., A Text Book of Zoology. 14th ed. New Delhi: S. Chand and Co; 1967.
- Thorn G.W., Adams R.D., Braunwald E., Isselbacher K.J., Petersdorf R.G. Harrison's Principles of Internal Medicine. New York: McGraw Hill Co; 1977.
- Vigar Z. Atlas of Medical Parasitology. 2nd ed. Singapore: P.G. Publishing House; 1984.
- Chatterjee K.D. Parasitology, Protozoology and Helminthology. 6th ed. Calcutta: In Guha Ray Sree Saraswaty Press Ltd; 1967.
- Sollmann T. Anthelmintics: Their efficiency as tested on earthworms. *J Pharmacol Exp Ther* 1918; 12:129-70.
- Jain M.L., Jain S.R. Therapeutic utility of *Ocimum basilicum* var. album. *Planta Med* 1972; 22:66-70.
- Dash G.K., Suresh P., Kar D.M., Ganpaty S., Panda S.B. Evaluation of *Evolvulus alsinoides* Linn. For anthelmintic and antimicrobial activities. *J Nat Rem* 2002; 2:182-5.
- Szewezuk V.D., Mongelli E.R., Pomilio A.B. Antiparasitic activity of *Melia azadirach* growing in Argentina. *Molecular Med Chem* 2003; 1:54-7.
- Shivkar Y.M., Kumar V.L. Anthelmintic activity of latex of *Calotropis procera*. *Pharma Biol* 2003; 41:263-5.
- Bate Smith E.C. The phenolic constituent of plants and their taxonomic significance, dicotyledons. *J Linn Soc Bot* 1962; 58:95-103.
- Martin R.J. Mode of action of anthelmintic drugs. *Vet J* 1997; 154:11-34.