African Journal of Biomedical Research, Vol. 9 (2006); ***67 -69***
ISSN 1119 – 5096 © Ibadan Biomedical Communications Group

Full-text available at
http://www.ajbrui.com
&
http://www.bioline.br/md

Short communication

Antifungal potential of flower head extract of *Spilanthes acmella* Linn.

Sabitha A. Rani and Suryanarayana U. Murty*

Bioinformatics Group (Biology Division),
Indian Institute of Chemical Technology,
Hyderabad 500 007, India

ABSTRACT

Different concentrations of Spilanthes acmella flower head extract were evaluated for antifungal activity (0.1 to 2.0 mg). The diameter of inhibition zones ranged from 0.1 to 2.3 cm with the increase in concentration of test solution. In all the organisms, the maximum zone of inhibition was observed at 2000mg concentration. Among different fungal species, high inhibition zones were observed in Fusarium oxysporium (2.3 cm) and Fusarum moniliformis. (2.1 cm) followed by Aspergillus niger (2.0) and Aspergillus paraciticus (1.8 cm). ***(Afr. J. Biomed. Res. 9: 67–68, January 2006)***

Received:
November, 2005
Accepted (Revised):
December, 2005
Published
January, 2006

***Keywords*:** Antifungal/ evaluation/ flower head extract/ *S.acmella/* inhibition zone

**Author for Correspondence:* *(e-mail address):* sabitaammana@yahoo.com
Tel. 00-91-40-27193134; Fax: 00-91-40-27160757

Abstracted by:
African Index Medicus (WHO), CAB Abstracts, Global Health Abstracts, Asian Science Index, Index Veterinarius

INTRODUCTION

The indiscriminate use of chemical pesticides has given rise to serious environmental pollution, genetic resistance of pests, toxic residues in stored products and hazards from handling etc. Therefore, there is a need to develop botanical pesticides which are effective, biodegradable, broad-spectrum of activity and do not leave any harmful effect on environment. During last few decades, many plant species have been screened and plant-based products from a variety of sources have been identified and developed in this regard. The Asteraceae constitutes one of the largest vascular plant family, with 30,000 species and over 1100 genera. Most of these plants exhibit antimicrobial activity due to the production of sesquiterpene as principal secondary metabolites.

The present study was aimed to evaluate the *Spilanthes acmella* Linn. (Asteraceae) against the potential human pathogens *Asperigillus flavus, A. paraciticus* and agricultural pathogens *Fusarium oxysporium* and *F. moniliformis*.The genus *Spilanthes* contains 35 tropical species, of which three of them are reported from India. *Spilanthes acmella* Linn. (Family-*Asteraceae*) is an important medicinal plant commonly known as Akarkara or toothache plant with rich source of therapeutic constituents. It is an annual, spreading plant with bi-coloured, red/gold flower buds. The roots, flower heads and whole aerial part yield a compound known as spilanthol, which is a powerful stimulant, sialogogue and local anesthetic. In Ayurvedic system of medicine, flower heads and roots are used in treatment of scabies, psoriasis, scurvy, toothache, infections of gums and throat, paralysis of tongue and remedy for stammering in children (Anonymus, 1976). Because of its high medicinal value, there is a much demand of this plant in the market.

Plant Material and Chemical Extraction:

The dried flower heads of *Spilanthes acmella* were procured from the garden, IICT, Hyderabad. Flower heads were air dried and extracted with petroleum ether (40-60°C) using a Soxhlet apparatus. The extracts were filtered and concentrated in vacuum rotavapour. Different concentrations of plant extract (0.1, 0.4. 1.0.1.6, and 2.0 mg.) were made by dissolving in DMSO (Dimethyle Sulphoxide).

Test organisms: Four test organisms, *Aspergillus niger*, *Aspergillus paraciticus*, *Fusarium oxysporium*, *Fusarium monilifarmis*, were obtained from Institute of Microbial Technology, Chandigarh and maintained on Potato Dextrose Agar (PDA).

Bioassay: Agar cup bioassay was employed for testing antifungal activity of plant extract (Linday, 1962). The ready-made PDA medium (Hi-media, 39g) was suspended in distilled water and autoclaved at pressure of 15 lb/inc^2 for 20 min. Seven days old cultures of test organisms (0.5 ml) were seeded onto plate and uniformly spread with spreader. Six to eight wells (8mm) were made on PDA plate with sterile cork borer. To each well, different concentrations of test solutions (0.1mg to2.0 mg) were added. Controls were maintained with DMSO only. The treated and the controls were kept in an incubator at 37°C for 24h to 78h and inhibition zones were measured. Three to four replicates were maintained for each treatment.

RESULTS AND DISCUSSION

Effect of different concentrations (0.1 to 2.0 mg) of *S.acmella* flower head extract was tested against four different fungi (Table 1). All the concentrations of the test solution inhibited the fungal species with varying degree of sensitivity. The anti-fungal activity was very less at 0. 1mg concentration. The low activity of extract at lower concentrations may be due to the crude nature of the test solution. The diameter of inhibition zones ranged from 0.1 to 2.3 cm among different fungal species and increased with the increase in concentration of test solution. The maximum zone of inhibition was found at 2000µg concentration. Among the test organisms, high inhibition zones were observed in *F. oxysporium* (2.3 cm) and *F.moniliformis.* (2.1 cm) followed by *A. niger (*2.0) and *A. paraciticus* (1.8 cm).

Table 1:
Antifungal activity of *Spilanthes acmella* (flower head) extract on different fungi.

Con. (mg)	Zone of inhibition (cm)			
	Aspergillus niger	*Aspergillus parasiticus*	*Fusarium oxysporium*	*Fusarium moniliformis*
100	0.1	0.2	0.2	0.4
400	0.5	0.4	0.8	0.9
1000	1.1	0.9	1.0	1.3
1600	1.7	1.3	1.8	2.0
2000	2 .0	1.8	2.3	2.1

A similar study of screening the natural plant extracts against different fungal and bacterial pathogens was well recorded in literature (Ahmad et al 2000; Fabry et al 1998). Since plants have co-evolved with pathogens, it is reasonable to expect a variety of such compounds with

specific as well as general antifungal activity (Darokar et al 1998). The activity of different concentration of *S..acmella* extract may be due to the presence of pungent amide spilanthol and alkamides (Nakatani, 1992). Besides this, non-volatile sesquiterpenoids and saponins are also reported. (Krishnaswami et al 1975; Mukharya et al 1986).. Though some earlier reports of antimicrobial activity of some Asteraceae members (Rai et al 1999) and *S calva* (Rai et al 2004) were available, the present study of antifungal activity of *S. acmella* is a significant contribution. The present study has shown that the flower head extract of *S.acmella* possesses remarkable fungi toxic activity against many human and agricultural pathogens. Thus, there is a possibility of developing this plant as a source of antifungal agent and further investigations are necessary to identify the bioactive principles.

Acknowledgements: *The authors are grateful to DST, New Delhi for financial assistance and the Director, IICT, Hyderabad for his encouragement and support.*

REFERENCES

Ahmad, I., Mehmood, Z., Mohammad, P., Ahmed, S. (2000). Antimicrobial potency and synergistic activity of five traditionally used Indian medicinal plants. *Journal of Medicinal Aromatic Plant Sciences* Vol.22 (4A): 173-176.

Anonymous. (1976). Wealth of India, Raw materials. Publication and Information Directorate, CSIR, New Delhi, India. Vol (2):11-12.

Darokar, M.P, Mathur, A., Dwivedi, S., Bhalla, R., Kanuja, S.P.S, Sushil Kumar. (1998). Detection of antibacterial in the floral petals of some higher plants. *Current Science* Vol. 75 (3): 187-189.

Fabry, W., Okemo, P.O., Ausorg, R. (1998). Antibacterial activity of East African Medicinal Plants. *Journal of Ethnopharmocolgy*. Vol. 60 (1): 19-24.

Krishnaswami, N.R., Prasanna, S., Seahadri, T.R., Vedantham, T.N.C. (1975). *? a and ß- Amyrin esters and sitosterol glucoside from* Spilanthes acmella. Phytochemistry. *Vol 14:1666-1667.*

Linday, E. M.(1962),. *Practical Introduction to Microbiology, (E & FN spon Ltd), p-77.*

Mukharya, D..K.K, Ansari, A.H. (1986). *Olean-12-en-3-O-ß-D-Galactopyranosyl (1? 4)-O-a-l- rhamnopyranoside: a new triteropenoidal saponin from the roots of* Spilanthes acmella *(Murr).* Indian Journal of Chemistry *Vol. 26: 81-87.*

Nakatani, N., Nagashiwa, M. (1992). Pungent alkamides from *Spilanthes acmella* L. var. oleraceae. Clark. *Bioscience, Biotechnology and Biochemistry.* 56 (5):759-762.

Rai, M.K., Acharya, D.(1999). Screening of some Asteraceous plants for antimycotic activity. *Compositae Newsletter*. 34: 37-43.

Rai , M.K., Varma, A., Pandey AK.(2004). Antifungal potential of *Spilanthes calva* after inoculation of *Piriformospora indica. Mycoses*. Vol 47 (11-12): 479