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ANTIMITOTIC ACTIVITY OF *LANTANA CAMARA* FLOWERS

Ghangale G. D.*, Tambe R.Y., Gaykar A.J., Dama G.Y.

SGMSPM's Sharadchandra Pawar College of Pharmacy, Dumbarwadi, Otur, Dist-Pune, Maharashtra

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For Correspondence:

Ghangale G.D.

SGMSPM's Sharadchandra Pawar College of Pharmacy, Dumbarwadi, Otur, Dist-Pune, Maharashtra

E-mail:
gaurighangale@gmail.com

ABSTRACT

Lantana camara (L.) var. aculeate (family: Verbenaceae) commonly known as tantani (Marathi), pulikampa (Telugu) and caturang (Hindi) is a significant weed commonly found throughout India. Traditionally the plant is used as diaphoretic, carminative, antispasmodic, tonic and useful in the treatment of tetanus, vitiated conditions of vata, epilepsy, gastropathy. A decoction of fresh roots is a good gargle for odontalgia and this is used by hill tribes for all types of dysentery. Powdered flowers are used for cuts, wounds, ulcers, and swellings. An infusion of the flowers is good for bilious fever, eczema and eruptions. The fruits are useful in fistula, pustules, tumours and rheumatism. Extraction of *Lantana camara* flowers has been performed by using four different solvents such as Pet.ether, Chloroform, Ethanol and Water. All the obtained extracts were subjected for determination of preliminary anticancer activity by using *Allium cepa* root tip assay model. Thus in future it will be interesting not only to isolate the active chemical constituents but also to determine the mechanism of action.

INTRODUCTION

Cancer is the uncontrolled growth of cells coupled with malignant behavior: invasion and metastasis. Cancer is thought to be caused by the interaction between genetic susceptibility and environmental toxins. In the broad sense, most chemotherapeutic drugs work by impairing mitosis (cell division), effectively targeting fast-dividing cells. As these drugs cause damage to cells they are termed cytotoxic. Some drugs cause cells to undergo apoptosis called "programmed cell death". The use of minerals and plant-based medicines are believed to date back to prehistoric medicine. In present work an attempt has been made to study the pharmacognosy of the traditional or tribal medicine i.e. *Lantana camara*, the flowers of the plant are claimed to possess anti-tumor activity[1] and hence, efforts has been taken to determine the anticancer activity. Also, an endeavour has been made to perform phytochemical studies of the obtained extracts.

MATERIALS AND METHODS

Collection, Identification and Authentication of the *Lantana camara* flowers

The flowers of *Lantana camara* (Verbenaceae) were collected from Otur region of Junner, Dist.Pune, Maharashtra, the collected flowers were authenticated from the Botanical Survey of India, Western Office, 7, Koregaon Park, Pune (M.S.)

Extraction of the dried plant material by using-

The collected flowers were shade dried and were subjected for the successive soxhlet extraction by using various solvents such as Pet ether, Chloroform, and Ethanol. Maceration process was used for the aqueous extraction.

PHARMACOLOGICAL SCREENING OF CRUDE EXTRACTS:

Preliminary Anticancer activity

Antimitotic activity:

Procedure

The antimitotic activity was evaluated by using the meristematic cells of *Allium cepa* roots. The *A. cepa* bulbs were sprouted in tap water at room temperature. When the roots were about 5 mm long the bulbs were placed on beakers containing the extracts (10 mg/ml) such that the roots

were immersed in the extracts. The duration of treatments for each extracts was 1 and 3 hrs. Five bulbs were used for each extract and duration of treatment. The sprouted roots were also treated with distilled water and standard drug Methotrexate (0.1mg/ml), which are used as control and standard respectively. One hour later the root tips were cut and transferred to fixing solution acetic acid (45 %): ethanol (95 %) in the ratio of 1:3 V / V (10- 12 hrs) followed by warming the root tips in 1 N HCl in oven at 50°C for 15 min. The root tips thus treated were then stained with acetocarmine stain. The slide was then scanned under microscope to record the number of cells, non- dividing, and dividing cells and mitotic index was calculated using the following formula as per standard procedures.

$$\textbf{Mitotic Index} = \frac{\text{Number of dividing cells}}{\text{Total number of cells}} \times 100$$

All the extracts including pet ether, chloroform, ethanol and aqueous extracts were screened for preliminary anticancer activity by using antimitotic activity i.e. *Allium cepa* root tip assay method.

Fig.1 *Allium cepa* root length's achieved

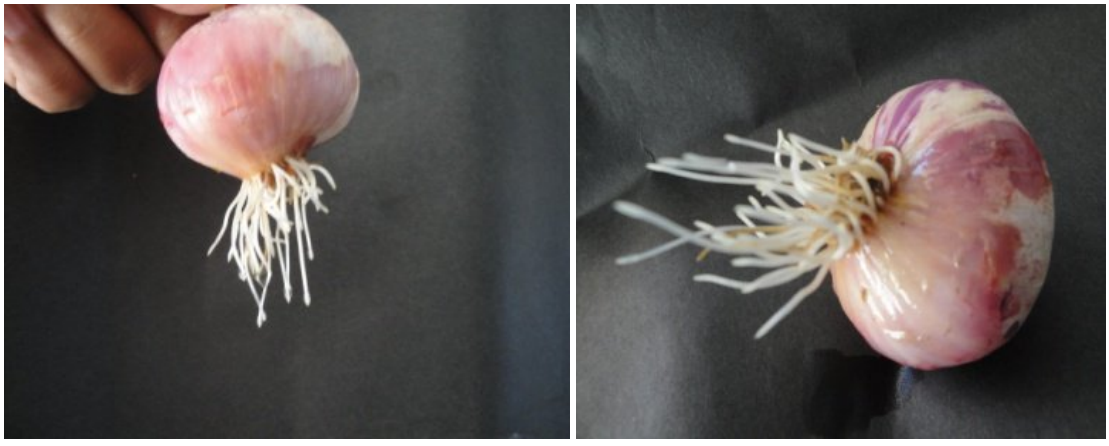

Fig.2 Image showing Prophase and Metaphase

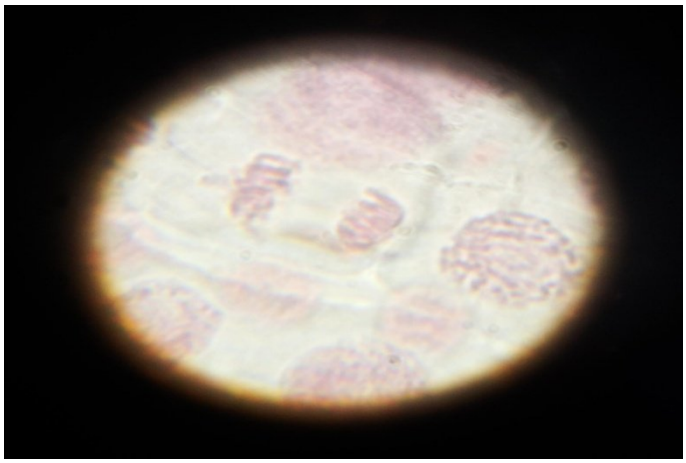

Table No. 2 Report on *Allium cepa* root length attained following treatment with various drugs

Groups	Root length (cms) All the values are expressed as Mean ± SEM		
	0 hours	**48 hours**	**72 hours**
Control (Vehicle)	2.90±0.27 (n = 12)	3.19±0.25 (n = 20)	3.92±0.39 (n = 34)
Std (Methotrexate) (0.1 mg/ml)	2.88±0.25 (n = 13)	2.69±0.11 (n = 22)	2.81±0.19 (n = 14)
Pet Ether Extract (10 mg/ml)	3.95±0.79 (n = 7)	2.41±0.71 (n = 15)	1.91±0.1 (n = 11)
Chloroform Extract (10mg/ml)	2.41±0.65 (n = 15)	2.84±0.21 (n = 29)	2.96±0.30 (n = 32)
Ethanolic Extract (10 mg/ml)	2.32 ± 0.11 (n = 14)	1.41 ± 0.29 (n = 9)	1.55 ± 0.05 (n = 4)
Aqueous Extract (10 mg/ml)	3.41±0.59 (n = 7)	2.55±0.72 (n = 15)	2.16±0.47 (n = 11)

Table No. 3 Report on mitotic index of *L.camara* extracts.

Extract	Mitotic Index (%)	
	1 hr	3 hr
Control (Vehicle)	90.2 ± 0.37	97.6 ± 0.50
Std (Methotrexate) (0.1 mg/ml)	57 ± 2.5	55.8 ± 0.58
Pet Ether Extract (10 mg/ml)	69.2 ± 2.9	64.1 ± 5.1
Chloroform Extract (10mg/ml)	75.3 ± 6.2	61.6 ± 4.1
Ethanolic Extract (10 mg/ml)	63.4 ± 1.6	45.4 ± 6.19
Aqueous Extract (10 mg/ml)	81.3 ± 2.15	67.8 ± 4.5

All the values are expressed as (Mean ± SEM)

A wide variety of anti-cancer drugs exhibit cytotoxic effect by interfering with cell-cycle kinetics. These drugs are effective against cells that are proliferating and produce cytotoxic effect either by damaging the DNA during the S-phase of the cell cycle or by blocking the formation of the mitotic spindle in M-phase. An alkylating agent, methotrexate interferes with DNA integrity and thereby exhibits strong anti-mitotic activity both *in vivo* and *in vitro.*

All the extracts which were subjected for the preliminary anticancer activity has shown significant anti-mitotic activity. Ethanolic extract exhibited better antimitotic activity as reduction in mitotic index was observed from 90.2 % to 63.4 % and from 97.6 % to 45.4 % after 1 and 3 hour treatment of extract having concentration of 10 mg/ ml.

Mitosis was normal in the control roots. Also the mitotic index of all the extracts treated roots were significantly lower than the mitotic index of control. Mitotic index of methotrexate was found to be 57.0 % and 55.8 % after 1 and 3 hour treatment respectively.

CONCLUSION

The preliminary anticancer activity was performed by using *Allium cepa* root tip assay method. And the results reveal significant anti-mitotic activity in all the extracts. Thus, it can be concluded that *Lantana camara* flowers possess significant anti-cancer activity. In future it will be interesting not only to isolate the active chemical constituents but also to determine the mechanism of action of the same by using different screening models.

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