



The world's worst aquatic plant as a safe cancer medicine "Antitumor activity on melanoma induced mouse by *Eichornia crassipes*: in vivo studies"

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ABSTRACT

Water hyacinth (*Eichornia crassipes*) is listed as one of the most productive plants on earth and is considered the world's worst aquatic plant. Water hyacinths are a severe environmental and economic problem in all of the gulf coast states and in many other areas of the world with a sub-tropical or tropical climate. In spite of all these by our present study we can say "the worlds worst aquatic plant as a safe cancer medicine". The in vivo growth response of a transplantable mouse melanoma with reference to 50% methanolic leaf extract of *Eichornia crassipes* (water hyacinth) was screened for its tumor inhibition potential by using B16F10 in vivo melanoma tumor bearing hybrid mice models (from *Swiss albino* female and C57BL male). The cell line was maintained in vivo in the department of research, Jawaharlal Nehru Cancer Hospital. Along with the standard diet the mice were treated with a daily oral dose of 200mg/kg body weight and 500mg/kg body weight of 50% methanolic extract *Eichornia crassipes*. On the other hand when these tumors has been subjected to herbal therapy followed by radio therapy, 4Gy in 3 fractions, revealed that the tumor inhibition is well appreciated by animal subjected to 500 mg/kg body weight followed by 200mg/kg body weight. The in vivo tumor regression was analyzed on day 1st-5th, 6th-10th, 11th-16th and 17th-20th. The observations revealed that tumor volume of test groups decreased when compared with control groups.

Keywords: Water hyacinth (*Eichornia crassipes*), Antitumor activity, in vivo studies

INTRODUCTION

Cancers are caused by abnormalities in the genetic material of the transformed cells. It can start in any organ of the body and may affect whole body. This makes it the second leading cause of death in world, exceeded only by heart disease. Every year, cancer is affecting more than a millions of people¹. Herbal and natural products have enormous popularity as self-medication products. They are perceived as natural, green, pure and without side effects. Furthermore, their popularity has resulted in more than 800 companies producing herbal products and collecting revenues in excess of dollar 4.5 billion². Herbal drugs basically used to decrease the side effects of melanoma treatment because treatment may damage healthy cells and tissues, unwanted side effects sometimes occur. These side effects depend on many factors including the location of tumor, type and extent of treatment. The side effects of surgery mainly depend on the size and location of tumor and the extent of operation. The side effect of chemotherapy depends mainly on the specific drugs and the dose. In general, anticancer drugs affect cells that divide rapidly especially blood cells, cells in hair roots and cells that line the digestive tract, due to these reasons we must go for herbal drugs³. It is high time to develop a new drug in oncology which should be cost effective and easily approachable by layman. This pre clinical research will defi-

nately throw some answers for cancer treatment and helps in reducing the worries and pain of treatments like Chemotherapy and Radiotherapy and will bestow answers to many of the queries of oncology in near future. Water hyacinth (*Eichornia crassipes*) is listed as one of the most productive plants on earth and is considered the world's worst aquatic plant. Water hyacinths are a severe environmental and economic problem in all of the gulf coast states and in many other areas of the world with a sub-tropical or tropical climate.^{4,5} In spite of these by our present study we can say "the worlds worst aquatic plant can be used as a safe cancer medicine"

MATERIALS & METHODS:

Animals & animal ethical committee approval

24 adult male mice (hybrid from *Swiss albino* female and C57BL male) of 6-8 weeks old with an average weight of 30±1g were used for experiment. The animals were kept, maintained in air conditioned animal house and fed on a standard diet of mouse food and water ad libitum, were used for the studies⁶, accordance with institutional regulations and national criteria for animal experiments. The use of animals was as per CPCSEA norms (CPCSEA Registration no – 500/01/a/ CPCSEA/2001) approval for experimental work was as per animal ethical committee of Research Jawaharlal Nehru Cancer Hospital & Research Centre, Idgah Hills, Bhopal 462001 India.

Tumor:

B16F1 mouse melanoma was originally procured from the department of Research Jawaharlal Nehru Cancer Hospital & Research Centre, Idgah Hills, Bhopal India, and propagated by serial transplantation

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on the dorsal skin of adult hybrid mice of either sex. For experiments, 5×10^5 viable cells were injected intradermally on the dorsal skin. Once the palpable tumor developed, its diameters in three perpendicular planes (D1, D2, D3) were measured using a vernier caliper and the tumor volume (V) was calculated using the formula:

$$V = \pi/6 \cdot D1 \cdot D2 \cdot D3^7$$

Drug & doses:

50% methanolic leaf extract of, *Eichornia crassipes* was prepared by the method of Suffness and Dourous⁸.

The dose of used *Eichornia crassipes* was 200 mg/kg body weight and 500 mg/kg body weight of mice and they were treated with these doses orally for 20 days, dissolved in DDW.

Irradiation: The radiation dose were used 4 Gy in 3 fractions Cobalt 60-[?] radiation source (Department of radiology, JN Cancer Hospital and Research Center, Bhopal).

EXPERIMENTAL:

Determination of acute drug toxicity:

The acute toxicity *Eichornia crassipes* of was determined by LD50 method⁹

Drug dose response:

Animals were divided into groups of six and treated as follows:

S.No.	Group	Treatment	No.Of Animal/ Group
1	(A) Control	DDW(only)	4 animals
2	(A1)Test	Drug(200mg/kg)	4 animals
3	(A2)Test	Drug(500mg/kg)	4 animals
4	(B) Control (radiation)	Radiation(4Gy)	4 animals
5	(B1)Test	Radiation(4Gy)+4 animals	
6	(B2)Test	Radiation(4Gy)+ 4 animals	
		Drug(200mg/kg)	
		Drug(500mg/kg)	

Drug: *Eichornia crassipes* (50% methanolic)

Radiation Source: (Department of Radiology, JN Cancer Hospital and Research Center, Bhopal).

OBSERVATIONS & RESULTS:

Table: *Eichornia crassipes* (50% methanolic leaves extract) have shown the tumor inhibition potential, when subjected alone and subjected to radiotherapy.

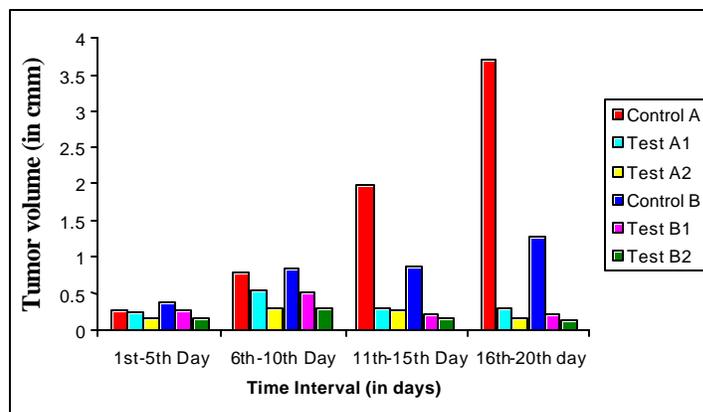
Group	Tumor volume (cm ³) after			
	1 st -5 th Day	6 th -10 th Day	11 th -15 th Day	16 th -20 th Day
Control A	0.251±0.0243	0.790±0.992	1.989±0.0912	3.71±0.196
Test A1	0.241±0.0175	0.539±0.0515	0.28±0.05	0.28±0.05
Test A2	0.139±0.008	0.27±0	0.255±0.035	0.16±0.02
Control B	0.383±0.0106	0.834±0.027	0.868±0.0013	1.258±0.012
Test B1	0.2635±0.0015	0.5085±0.07995	0.2295±0.006	0.208±0.01
Test B2	0.1755±0.0115	0.285±0.005	0.153±0.003	0.129±0.0415

All test groups are significant at $p < 0.05$ as compared to control group on 1st-5th, 6th-10th, 11th-15th and 16th-20th day.

DISCUSSION&CONCLUSION:

LD50 did not produce any death at 500mg/kg .The antitumor activity of 50% methanolic extract of *Eichornia crassipes* revealed that there is a slow and steady growth in tumor volume but there was a drastic fluctuation in tumor size after the day 6th to10th day .It

Graph: Graph shows the effect of 50% methanolic leaves extract of *Eichornia crassipes* on tumor inhibition, when subjected alone and subjected to radiotherapy



was noticed that tumor test groups and radiation test groups, tumor size has been decreased as compared with the control groups.

On the day 20th in tumor control group A, tumor volume has been doubled by 15 times, however, in test group A1 [Tumor +Drug (200mg/kg) BW] and in test group A2 [Tumor +Drug (500mg/kg) BW] have been doubled by 1.16 and 1.23 times, respectively.

On the day 20 the radiation control group B [Tumor + Radiation] has shown tumor doubling time by 3.5 times whereas the radiation test group B1 [tumor + radiation +drug(200mg/kg) BW] and radiation test group B2[tumor +radiation +drug(500mg/kg) BW] have been doubled by 0.79 and 0.74 times respectively.

Hence it is well cleared that *Eichornia crassipes* have shown the tumor inhibition potential, when subjected alone and subjected to radiotherapy.

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