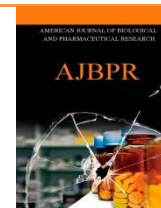




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GROWTH INHIBITION OF ALBINO RATS BY *CASSIA ALATA* L. (ASTERACEAE) LEAVES : EFFECT OF SEASON

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Article Info	ABSTRACT
<p>Received:29/07/2014 Revised:16/08/2014 Accepted:19/08/2014</p> <p>Key words:- <i>Cassia alata</i> L., growth inhibition, albino rats.</p>	<p>Growth inhibition in terms of body weight reduction of albino rats by the leaves of <i>Cassia alata</i> L. was studied. It was observed that leaves of <i>C. alata</i> L. could inhibit growth of rats. Though growth inhibition started right from 10th day, significant inhibition was observed from 20th day onwards. Effect of season in growth inhibition of rats by the leaves of <i>C. alata</i> L. was also studied. Results showed that leaves of <i>C. alata</i> L. during the months of July and August had maximum growth inhibitory activity.</p>

INTRODUCTION

Cassia alata L.(family, Caesalpinaceae) is an erect tropical annual herb with leather compounded leaves. The plant was native to Ghana and Brazil, but it is now widely distributed throughout the world [1]. Even in India in the state of West Bengal, the plant grows everywhere up to 6 ft tall. *C. alata* L. is widely known in the name of wild senna. It has other names also. They are: ringworm weed in English, dadmari in Hindi and cakramard in Sanskrit. Its therapeutic values as mentioned in Ayurvedic text [2,3] are: leaves are anti-parasitic, used in eczema, bronchitis, asthma, ringworm and in poisonous insect bites, bark is used to treat skin diseases, extract of aerial parts is CNS depressant, diuretic and anti-inflammatory. Modern researchers advocated the use of *C. alata* L. for treatments of blennorrhagia, syphilis, diabetes, haemorrhoids, constipation, inguinal hernia and intestinal parasitosis [4-6]. Traditionally the plant is used as antihelminthic, in infection and in uterus disorder [7,8].

Makinde reported that all parts of *C. alata* L. have one or more medicinal actions especially antimicrobial

activities [9]. In 1998 Sakharkar and Patil confirmed antimicrobial activity of *C. alata* L. [10]. We also noted that leaves of *C. alata* L. could inhibit growth of *Staphylococcus aureus* [11].

After considering all these medicinal properties of *C. alata* L., it was thought worthwhile to study the negative side, if any, of the plant. We therefore intended to study the effect of *C. alata* L. leaves on growth inhibition in terms of body weight reduction of rats as we already noted this effect for two other medicinal plants [12,13]. Studies relating to growth inhibition of rats by the leaves of *C. alata* L. of different seasons were also undertaken.

MATERIALS AND METHODS

Plant material

Leaves of *C. alata* L. were collected in morning hours (9 – 10 AM) from the medicinal plants garden of the University of North Bengal, Dist. Darjeeling, west Bengal, India randomly and during the periods of January – February, March – April, May – June, July – August, September – October and November – December of the year 2012. Leaves were authenticated by the experts of the department of Botany of the said University. A voucher specimen was kept in the department of Biochemistry, North Bengal Medical College, Dist. Darjeeling, West Bengal, India for future reference.

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Preparation of the Test Drug

Leaves of *C. alata* L. were shade dried and powdered. This powder was used as test drug.

Figure 1. *Cassia alata* L.



Acute oral toxicity study

Acute toxicity studies were carried out on Swiss albino mice by the method of Ghosh [14]. Test drug developed from the leaves of *C. alata* L. was given at doses of 100, 200, 500, 1000 and 3000 mg/kg to different groups of mice each group containing six animals. Watery suspension of the test drug was given to the animals orally through a feeding tube. After administering the test drug, the animals were observed for the first three hours for any toxic symptoms followed by observation at regular intervals for 24 hours up to seven days. At the end of the study, the animals were also observed for general organ toxicity, morphological behavior and mortality.

Animals

Male Wister strain rats, body weight between 35 and 40g, were used for this study. Animals were housed individually in polypropylene cages, maintained under standard conditions like 12h light and 12h dark cycle, 20 - 30 degree centigrade, 35 - 60 % humidity. Rats were fed with standard rat pellet diet (Hindustan Lever Ltd., Mumbai, India) and provided water *ad libitum*. The animal experiment was approved by the ethics committee of the Institute.

Experimental design

In first set of experiment, rats were divided into two groups of eight each. First group of animals took normal diet while animals of the second group, in addition to normal diet, took test drug prepared from randomly collected leaves of *C. alata* L. in the dose of 1g/kg body weight daily. Test drug in the form of suspension in water was administered to the rats orally through a feeding tube. Dose selection of the test drug was as per of our earlier studies [15-17]. Experiment was continued for 40 days.

In second set of experiment rats were divided into following groups of eight each.

- (1) **Control:** In this group normal diet and water were given to rats.
- (2) ***C. alata* L. (January – February):** Powder from leaves of *C. alata* L. of the periods January – February was given to the rats daily through oral route along with normal diet and water. Dose was 1g/kg body weight of the animals.

(3) ***C. alata* L. (March – April):** Powder from leaves of *C. alata* L. of the periods of March – April was given to the rats. Rest part was same to that of group – 2.

(4) ***C. alata* L. (May – June):** Powder from leaves of *C. alata* L. of the periods May – June was given to the rats. Rest part was same to that of group – 2.

(5) ***C. alata* L. (July – August):** Powder from leaves of *C. alata* L. of the periods July – August was given to the rats. Rest part was same to that of group – 2.

(6) ***C. alata* L. (September – October):** Powder from leaves of *C. alata* L. of the periods September – October was given to the rats. Rest part was same to that of group 2.

(7) ***C. alata* L. (November – December):** Powder from leaves *C. alata* L. of the periods November – December was given to the rats. Rest part was same to that of Group – 2. Experiment was continued for forty days.

Growth of rats

Growth of rats was measured on 10th, 20th, 30th and 40th day. Overall behavior of the animals was noted.

Statistical analysis

The values were expressed as mean \pm SEM and were analyzed using one-way analysis of variance (ANOVA) using Statistical Package for Social Sciences (SPSS). Differences between means were tested employing Duncan's multiple comparison test and significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Acute toxicity studies

Acute toxicity studies revealed that the test drugs (powder of leaves of *C. alata* L.) did not produce any toxic symptoms when administered orally to mice in doses of 100, 200, 500, 1000 and 3000 mg/kg. Animals were healthy, cheerful and behaved normal throughout the experimental period. No death of animal was recorded during seven days of experiment.

Table – 1 shows effect of powdered leaves of *C. alata* L. (randomly collected) on body weight of rats. It appears from the table that leaves of *C. alata* L. could decrease body weight of rats. For first ten days the decrease was not statistically significant but after that up to 40 days there was significant decrease ($p < 0.001$) in body weight in those rats who took powdered leaves of *C. alata* L. in addition with normal diet. The animals also developed anorexia. Results' relating to the seasonal variations in growth inhibition of rats by powdered leaves of *C. alata* L. was given in Table2. Results showed that maximum inhibition in growth of rats by the leaves of *C. alata* L. was found during the period July to August. Results were statistically significant up to the level of $p < 0.001$. Leaves of *C. alata* L. (for the months of September – October and November - December) could also decrease body weight of the rats but the magnitude was less than that of the leaves of *C. alata* L. for the months of July and August. Leaves of *C. alata* L. for the months of January – February, March –



April and May – June however, did not show any effect on growth inhibition in rats. Effect of leaves of *Cassia alata* L. of different seasons on body weight of rats on 40th day of experiment was shown in Figure – 3.

Fluck and Pharm [18] showed influence of climate on the active principles in medicinal plants. Thereafter, series of experiments were conducted in this direction. Now a days numerous reports are available in literature which

suggest that accumulation of chemical compounds in roots, stem and leaves of plants varies with season [19-23].

Maximum growth inhibition of the rats by the leaves of *C. alata* L. during the period of July to August is probably due to accumulation of chemical compound(s) in the leaves responsible for body weight reduction. We are now engaged to work of isolation and characterization of the chemical compound(s).

Table 1. Effect of powdered leaves of *Cassia alata* L. (randomly collected) on growth of rats (Changes of body weight in gram)

Group	Treatment	10 th day	20 th day	30 th day	40 th day
1	Normal	40.3 ± 1.5	59.9 ± 1.7	60.2 ± 1.9	71.1 ± 2.0
2	<i>Cassia alata</i> L. leaves	38.0 ± 0.9	49.1 ± 2.5*	40.2 ± 1.1**	38.4 ± 1.0**

*p<0.001, *C. alata* L. : 1 g / kg, . * p < 0.05, ** p < 0.001.

Table 2. Seasonal variations in anti-growth property of powdered leaves of *Cassia alata* L. (Changes of body weight in gram)

Treatment	10 th day	20 th day	30 th day	40 th day
Normal	40.7 ± 1.2	59.5 ± 1.6	61.7 ± 1.7	70.5 ± 2.6
<i>C. alata</i> L. (Jan-Feb)	39.5 ± 1.4	56.3 ± 1.8	59.9 ± 1.4	67.4 ± 2.7
<i>C. alata</i> L. (March – April)	40.5 ± 1.2	59.1 ± 1.9	60.5 ± 1.8	69.7 ± 2.9
<i>C. alata</i> L. (May – June)	38.1 ± 1.3	55.5 ± 1.3	58.2 ± 1.4	65.2 ± 2.7
<i>C. alata</i> L. (July – August)	36.9 ± 1.4	49.2 ± 1.6*	40.6 ± 1.8**	35.3 ± 1.1**
<i>C. alata</i> L. (Sept. – Oct.)	37.7 ± 1.3	54.5 ± 1.3	50.5 ± 1.7*	58.1 ± 2.1*
<i>C. alata</i> L. (Nov. – Dec.)	38.6 ± 1.6	55.2 ± 1.4	51.4 ± 1.6*	59.9 ± 1.9*

*p<0.001, *C. alata* L. : 1 g / kg, . * p < 0.05, ** p < 0.001.

Figure 2. Effect of powdered leaves of *Cassia alata* L. (randomly collected) on growth of rats (Changes of body weight in gram)

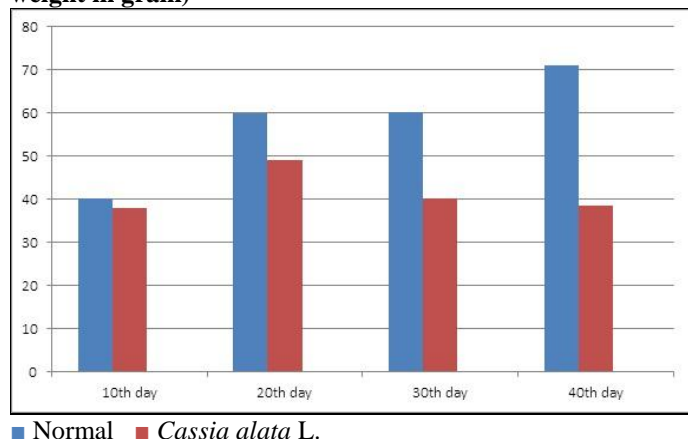
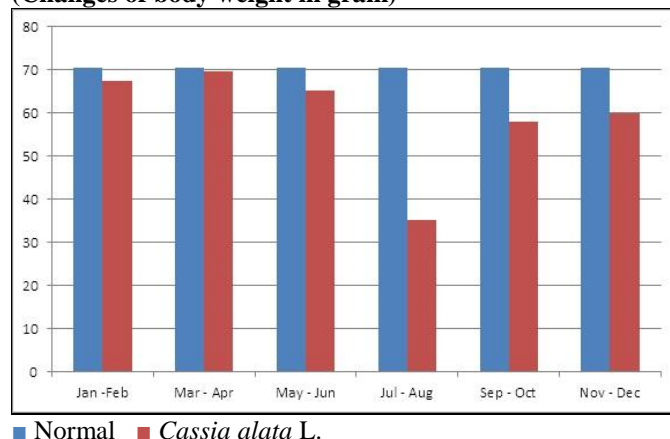


Figure 3. Effect of leaves of *Cassia alata* L. of different seasons on body weight of rats on 40th day of experiment (Changes of body weight in gram)



CONCLUSION

The present study showed that leaves of *Cassia alata* L. could inhibit growth of rats. Growth was in terms of body weight. Maximum inhibition was noted with the leaves of *C. alata* L. during the period July to August.

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