



## ANTI MITOTIC ACTIVITY OF BOUGAINVILLEA GLABRA

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### ARTICLE INFO

### ABSTRACT

#### Key Words

*Bougainvillea glabra*,  
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Cancer is a fatal disease in which uncontrolled proliferation is the major crunch point to be considered. The current work is carried out to screen anti mitotic activity of *Bougainvillea glabra* on legume seeds. Three legume seeds viz., Bengal gram, green gram and fenugreek were selected for the study and the ability of the methanol extract to inhibit the germination was calculated. The results indicated that the extracts are having a significant inhibition in the growth of the radicle of the seeds. The anti mitotic activity can be attributed to the chemical constituents present in the extract. The phytochemical screening showed that the species is rich in various phytochemicals like alkaloids, glycosides, terpenoids, flavonoids, saponins, steroids and tannins. These bioactive compounds, especially the tannins, terpenoids and steroids might be responsible for the said activity. Further research is in process to identify and isolate the secondary metabolite which is responsible for the reported activity.

### INTRODUCTION:

*Bougainvillea glabra* is an ornamental shrub also called as a paper flower<sup>1</sup>. It is native to many tropical and subtropical areas like Middle East, North America, Brazil, India etc. The genus *Bougainvillea* belongs to the family Nyctaginaceae<sup>2</sup>. Out of 18 species of the genus *Bougainvillea glabra* is one of the famous species. The leaves are generally having small hairs. The flowers are in very attractive combinations colours like with white, red yellow, orange, violet and purple. The stems are thin, with repeated prickles<sup>3</sup>.

Traditionally, the plant is used in variety of ailments like ulcer, cough, diarrhea, hepatitis and as an expectorant. The leaves are having more extensive uses like anti diabetic<sup>4</sup>, anti viral<sup>5</sup>, anti inflammatory<sup>3</sup>, anti microbial<sup>6</sup>, anti fertility properties<sup>1</sup>. Cancer is deadly disease, which involves the abnormal proliferation of cells along with malignancy and metastatic behavior. The current drugs in cancer chemotherapy mainly target the highly dividing cells. These drugs are cytotoxic and cause mitotic arrest. Some drugs may lead to a programmed cell death

called apoptosis<sup>7</sup>. The poly phenols like tannins are reported to have apoptotic activity. Since *Bougainvillea glabra* possesses various phytochemicals including polyphenols, the present study is to screen anti mitotic activity by using different legume seeds. The inhibition of sprouting in Bengal gram (*Cicer arietinum*), Green gram (*Vigna radiata*) and Fenugreek (*Trigonella foenum-graecum*) indicates that the extract is involving in the M phase of the cell division and causing mitotic arrest.

## MATERIALS AND METHODS

**Collection and extraction:** The leaves were collected from the local forest field of Hayathnagar, Hyderabad. The species authenticated and a voucher specimen was preserved in the college herbarium for future reference. The leaves were washed to remove earthy matter and shade dried for few days. After complete drying, they are subjected to Soxhlet extraction by using various solvents starting from non-polar to polar. N-Hexane, Ethyl acetate and Methanol were used for the exhaustive extraction which yielded the respective extracts.

**Preliminary phytochemical screening:** The three extracts were screened for phytochemicals by using standard procedures<sup>9,10</sup>. The results were depicted in Table 1.

### Preparation of legume seeds:

High quality Bengal grams, green grams and fenugreek were procured from the local market. Seeds with equal weight were taken and soaked overnight with water to accelerate the germination<sup>10</sup>.

### Preparation of extracts:

The three extracts were prepared in different concentrations (0.5, 1.0, 1.5 and

2.0 mg/ml). Gum acacia was used wherever it is necessary. One positive control (Doxorubicin) and one negative control (Distilled water) is also maintained.

### Determination of anti mitotic activity:

Bengal gram, green gram and fenugreek seeds having good quality were taken and soaked for overnight. After 24 hours, the seeds with good size and texture were selected. All the seeds were divided into groups having 10 seeds and average weight of 10 seeds was recorded<sup>11</sup>. The seed samples were added to the petri dish containing moist filter paper and allowed for germination for two days with continuous monitoring. Moisture is maintained in petri dishes throughout the experiment. The length of the radicles of the three seeds was measured after 2 days and calculated the percentage of inhibition. The results are illustrated in the Table 2-4.

**Statistical data:** All the values are expressed as Mean  $\pm$ SD. One-way ANOVA and Dunnett's test was used for comparison.

## RESULTS AND DISCUSSIONS

### Preliminary phytochemical screening:

The preliminary phytochemical screening of the methanol extract of *Bougainvillea glabra* revealed the presence of various phytochemicals like alkaloids, glycosides, terpenoids, steroids, saponins, flavonoids and tannins. The results were showed in Table 1. All the three extracts were selected for the screening of anti mitotic activity.

### Anti mitotic activity:

The anti mitotic activity of *Bougainvillea glabra* extracts showed that the leaves are showing a significant anti mitotic activity in Bengal gram, green gram and fenugreek seeds (Table 2-4) in dose dependent manner by taking Doxorubicin as standard.

**Table 1: Preliminary phytochemical screening of *Bougainvillea glabra***

Phytochemicals	n-Hexane extract	Ethylacetate extract	Methanol extract
Alkaloids	+	-	+
Glycosides	-	+	+
Terpenoids	+	+	+
Steroids	+	+	-
Saponins	-	+	+
Flavonoids	-	+	+
Tannins	-	+	+
Carbohydrates	-	-	-
Lipids	-	-	-
Proteins	-	-	-

+ Present, - Absent

**Table 2: Anti mitotic activity of *Bougainvillea glabra* by inhibiting sprouting in Bengal gram seeds**

Concentration	n-Hexane extract	Ethyl acetate extract	Methanol extract
Negative control (Distilled water)	<b>2.65</b>	<b>2.65</b>	<b>2.65</b>
Positive control (Doxorubicin)	<b>0(100)</b>	<b>0(100)</b>	<b>0(100)</b>
0.5 mg/ml	<b>2.12(20)</b>	<b>1.97(25.66)</b>	<b>1.24(53.20)</b>
1mg/ml	<b>1.65(37.73)</b>	<b>1.42(46.41)</b>	<b>0.72(72.83)*</b>
5mg/ml	<b>0.74(72.07)*</b>	<b>0.63(76.22)*</b>	<b>0.07(97.35)*</b>
10mg/ml	<b>0.1(99.62)*</b>	<b>0(100)*</b>	<b>0(100)*</b>

P values are expressed in the comparison with the control, \*P<0.05 are considered as statistically significant.

**Table 3: Anti mitotic activity of *Bougainvillea glabra* by inhibiting sprouting in Green gram seeds**

Concentration	n-Hexane extract	Ethyl acetate extract	Methanol extract
Negative control (Distilled water)	<b>2.26</b>	<b>2.26</b>	<b>2.26</b>
Positive control (Doxorubicin)	<b>0(100)</b>	<b>0(100)</b>	<b>0(100)</b>
0.5 mg/ml	<b>2.22(1.76)</b>	<b>2.18(3.53)</b>	<b>1.34(40.70)</b>
1mg/ml	<b>1.26(44.24)</b>	<b>1.16(48.67)</b>	<b>0.87(61.50)*</b>
5mg/ml	<b>0.38(83.18)*</b>	<b>0.22(90.26)*</b>	<b>0.19(91.59)*</b>
10mg/ml	<b>0.08(96.46)*</b>	<b>0(100)*</b>	<b>0(100)*</b>

P values are expressed in the comparison with the control, \*P<0.05 are considered as statistically significant.

**Table 4: Anti mitotic activity of *Bougainvillea glabra* by inhibiting sprouting in Fenugreek seeds**

Concentration	n-Hexane extract	Ethyl acetate extract	Methanol extract
Negative control (Distilled water)	<b>0.98</b>	<b>0.98</b>	<b>0.98</b>
Positive control (Doxorubicin)	<b>0(100)</b>	<b>0(100)</b>	<b>0(100)</b>
0.5 mg/ml	<b>0.94(4.08)</b>	<b>0.93(5.10)</b>	<b>0.72(26.53)</b>
1mg/ml	<b>0.27(72.44)*</b>	<b>0.24(75.51)*</b>	<b>0.15(84.69)*</b>
5mg/ml	<b>0(100)*</b>	<b>0(100)*</b>	<b>0.01(98.97)*</b>
10mg/ml	<b>0(100)*</b>	<b>0(100)*</b>	<b>0(100)*</b>

**P values are expressed in the comparison with the control, \*P<0.05 are considered as statistically significant.**

The percentage inhibition in the imbibitions of the seed germination indicates that the methanol extract is inhibiting the seed germination as highest compared to the n-hexane and ethyl acetate extracts. The methanolic extract, even at a dose of 0.5 mg/ml, is capable of inhibiting the germination of Bengal gram by 53.7%, green gram by 40.7% and fenugreek by 26.53% which shows it's potent anti mitotic activity. The hexane extract and ethyl acetate extracts are also showing significant anti mitotic activity from the dose of From 5mg/ml. From the results it is clear that the methanolic extract is completely inhibiting the germination at a dose more than 5mg/ml. The results also indicate that the extract is sensitive to the Bengal gram.

#### CONCLUSION:

In conclusion, the experimental results revealed that the leaves of *Bougainvillea glabra* are having various phytoconstituents. It is also can be concluded that it also possess anti mitotic activity against the germination of the legume seeds. The probable inhibition of cell division in the legume seeds indicates that *Bougainvillea glabra* methanol extract is capable of producing lead molecules for

the treatment of deadly diseases like cancer. Further investigation is needed in isolation and characterization of the bio active molecules from *Bougainvillea glabra* which are having the potency to treat cancer.

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#### Conflict of interest:

Authors do not have any conflict of interest.

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