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### EVALUATION OF ANTIINFLAMMATORY ACTIVITY OF *PHASEOLUS SEMIERECTUS* (L.) SEEDS

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#### ABSTRACT

To evaluate the anti-inflammatory activity of the seeds of *Phaseolus semierectus*. Anti-inflammatory activity was conducted by using Carrageenan induced rat paw oedema model. The thickness of paws of rats was measured every hour up to 5 hrs for methanolic extract at doses of 100, 200 and 400mg/kg by volume displacement method, using plethysmometer. All doses of the extract (methanol) from the seeds of *Phaseolus semierectus* showed significant percentage of inhibition on Carrageenan induced paw oedema; methanol extract from the seeds of *Phaseolus semierectus* at dose 400mg/kg produced significant ( $P < 0.001$ ) percentage of inhibition when compared to other doses. *Phaseolus semierectus* seeds extract (methanol), showed significant anti-inflammatory activity.

**Key Words:-** *Phaseolus semierectus*, Seeds, Anti-inflammatory activity.

#### INTRODUCTION

*Phaseolus semierectus* commonly known as purple bean belongs to family Fabaceae. The consumption of dry common beans has been associated with a decrease risk for a wide variety of chronic and degenerative diseases such as cancer, obesity, diabetes and cardiovascular diseases. Beans are considered as a good source of high protein content, complex carbohydrates, dietary fiber and some vitamins and minerals. In addition to these nutritional components, common beans are rich in a variety of several phytochemicals with potential health benefits such as polyphenolic compounds, fiber, lectins and trypsin inhibitors (Reynoso *et al.*, 2006). Seeds of *Phaseolus vulgaris* are used as Antioxidant, Anti-inflammatory, Antidiabetic, Protective agent against DNA damage, Antifungal, Antiproliferative, Antiviral and

Antihyperlipidemic agents (Oomah and Corbé, 2010; Ocho-Anin Atchibri *et al.*, 2010; Ocho-Anin Atchibri and Kouakou, 2010; Azevedo *et al.*, 2003; Chan *et al.*, 2003; Ye *et al.*, 2001; Mauro *et al.*, 2011). Seeds of *P. mungo* are used as Immunostimulatory, Anticonvulsant, Hepatoprotective, Antihyperlipidemic and Nephroprotective agents (Nitin *et al.*, 2012; Yogendrasinh and Solanki Sunita, 2010; Nitin and Ifthekar, 2012; Jangra *et al.*, 2011; Solanki and Jain, 2010; Hepper *et al.*, 2011) and leaves are used as Anti-inflammatory, Analgesic and Ulcerogenic agents (Mohammed *et al.*, 2011). Seeds of *P. acutifolius* are used in the treatment of cancer (García-Gasca and Salazar-Olivob, 2002), *P. radiatus* seeds are used as Nephroprotective (Chaware, 2012), *P. coccineus* seeds are used as Antifungal and Anticancer agents (Chen *et al.*, 2009), *P. lunatus* possess Estrogenic activity (Zhao *et al.*, 2007). In the present study different doses of methanolic extract of *Phaseolus semierectus* seeds were investigated for anti-inflammatory activity.

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#### MATERIALS AND METHODS

### Preparation of extracts from the seeds of *Phaseolus semierectus*

The seeds of *Phaseolus semierectus* were collected from Tirumala hills, Chittoor, Andhra Pradesh, India and authenticated by Dr. Madhava shetty, taxonomist, Department of Botany, Sri Venkateswara University, Andhra Pradesh. Shade dried seeds of *Phaseolus semierectus* were powdered and separately extracted in a Soxhlet apparatus for 6 hrs with methanol and then concentrated under vacuum at temperature of 45°C by using rotary evaporator (Buchi), dried completely, weighed and stored in desiccators.

### Drug and Chemicals

Ibuprofen, Carboxy methyl cellulose sodium (Na CMC) and Carrageenan were purchased from Sigma chemicals, USA. All chemicals used in the study were of analytical grade.

### Animals

Albino rats (National Institute of Nutrition, Hyderabad, India) of either sex weighing 200-250gm were used in the studies. The animals were maintained under standard laboratory conditions at an ambient temperature of 23±2°C having 50±5% relative humidity with 12h light and dark cycle. The use and care of the animals in the experimental protocol has been approved by the local Institutional Animal Ethics Committee (Regd. No. 516/01/A/CPCSEA) following the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

### Acute inflammation model: carrageenan induced rat paw Oedema

Inflammation was induced in the left hind paw of each rat by sub - plantar injection of 1% carrageenan

suspension (0.1ml). The right hind paw of the rat was injected 0.1ml of saline. Group-I received drug vehicle (1% sodium CMC). Group-II received standard drug Ibuprofen at a dose of 10 mg/kg b.w. Group-III, IV and V received orally methanolic extracts of *Phaseolus semierectus* seeds at doses of 100mg/kg 200mg/kg and 400mg/kg b.w in sodium carboxy methyl cellulose suspension one hour prior to the induction of oedema by carrageenan injection. The paw volume of rats was measured at 0 hr and hourly intervals up to 5<sup>th</sup> hour after the administration of carrageenan by volume displacement method, using plethysmometer. (Duffy et al., 2001)

The percent inhibition of paw thickness was calculated using the formula:

$$\text{Percentage inhibition} = 100[1 - (Y_t / Y_c)]$$

Y<sub>t</sub> = Average increase in thickness of paw in groups tested with test compounds.

Y<sub>c</sub> = Average increase in thickness of paw in control

### Statistical Analysis

Data of Paw thickness was analyzed by using One-Way ANOVA followed by post hoc test Dunnett's test using Graph pad Prism-5 software. The results were expressed as Mean ±S.E.M. P<0.05 was considered as significant.

## RESULTS

### Carrageenan induced rat paw Oedema

*Phaseolus semierectus* seeds extract at 100 mg/kg, 200 mg/kg and 400mg/kg doses and Ibuprofen (10 mg/kg b.w.) inhibited the maximal paw oedema response by 34, 46, 60 and 72, respectively during the 5 h of the carrageenan-induced rat paw acute inflammation. Volume of mercury displaced in ml at various time intervals in hours is recorded. The results of antiinflammatory activity were shown in Table 1 and 2. Figure1.

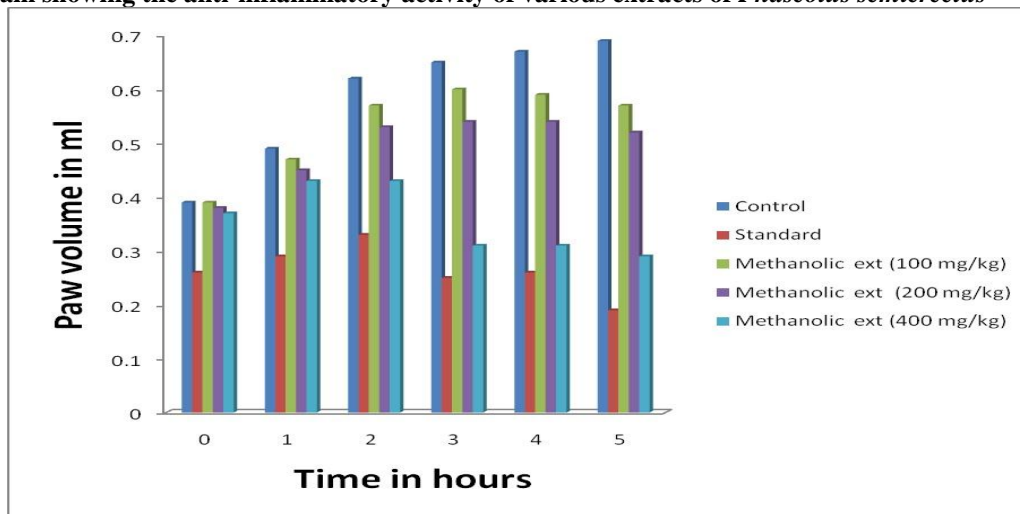
**Table 1. Anti-inflammatory activity of *Phaseolus semierectus* extracts on carrageenan induced paw oedema in rats**

S No	Treatment	Dose	Volume of mercury displaced in ml at various time intervals in hours.					
			0	1	2	3	4	5
1	Control	0.1 ml 1 % w/v	0.39 ± 0.025	0.49± 0.057	0.62± 0.057	0.65± 0.057	0.67± 0.057	0.69± 0.058
2	Ibuprofen	10 mg/ kg	0.25± 0.005	0.29± 0.005**	0.33±0.002***	0.25± 0.003***	0.25± 0.003***	0.19± 0.04***
3	Methanolic extract	100 mg/kg	0.38± 0.01	0.47± <sup>NS</sup> 0.02	0.59± <sup>NS</sup> 0.05	0.57± <sup>NS</sup> 0.03	0.57± 0.01*	0.55± 0.04*
4	Methanolic extract	200 mg/ kg	0.31± 0.01	0.41± 0.02**	0.47± 0.05**	0.41± 0.03**	0.41± 0.01**	0.39± 0.04***
5	Methanolic extract	400 mg/ kg	0.36± 0.01	0.37± 0.02**	0.39± 0.05***	0.29± 0.03***	0.30± 0.01***	0.28± 0.04***

Significance of difference in control and extracts treated groups were determined by one –way analysis of variance (ANOVA) \*\*\* P<0.001 \*\*P<0.01, \* P<0.05 are significant and <sup>NS</sup> P> 0.05, are not significant. All values are means of individual data obtained from six rats (n=6)

**Table 2. Percentage inhibition of *Phaseolus semierectus* extracts on carrageenan induced paw edema in rats**

S No	Treatment	Dose	% Inhibition of paw volume at various time intervals					
			0	1	2	3	4	5
1	Control	0.1 ml 1 % w/v	00	00	00	00	00	00
2	Ibuprofen	10 mg/ kg	00	40	46	61	62	72
3	Methanolic extract	100 mg/ kg	00	4	4	12	14	20
4	Methanolic extract	200 mg/ kg	00	16	24	36	38	43
5	Methanolic extract	400 mg/ kg	00	24	37	55	55	59

**Fig 1. Histogram showing the anti-inflammatory activity of various extracts of *Phaseolus semierectus***

## DISCUSSION

Inflammation can be induced by many different stimulating factors, including physical damage, precursor chemicals, microbial invasion and immune responses (Kumar *et al.*, 2003; Majno and Joris, 2004; Gregory and Barton, 2008). Carrageenan induced edema is commonly used as an experimental animal model for acute inflammation and is believed to be biphasic, of which the first phase is mediated by the release of histamine and 5-HT followed by kinin release and then prostaglandin in the later phase (Amosora *et al.*, 1998; Alcaraz and Jimenez, 1988). Non-steroidal anti-inflammatory drugs (NSAIDs) have been widely used to treat inflammatory disorders in clinical practice because of their fast onset of action and excellent curative effects. Side effects of NSAIDs include ulceration in the gastro-intestinal system (Gabriel *et al.*, 1991; Allison *et al.*, 1992; Hawkey, 2000), platelet dysfunction, and cerebral and cerebellar adverse effects (Aygün *et al.*, 2012). The results in the present

study indicate that pretreatment with the selected plant extracts and ibuprofen suppressed the increased paw oedema produced by the phlogistic agent. Phytochemical screening confirmed the presence of flavonoids, tannins and saponins in the methanolic extract of seeds of *Phaseolus semierectus*. There were some earlier reports on different phytochemical constituents of plants possessing anti-inflammatory activity (Calixto *et al.*, 2004; Anilkumar *et al.*, 2010; Aquino *et al.*, 1991; Molnar V and Garai J, 2005; Das *et al.*, 2005). Therefore, it is assumed that anti-inflammatory activity may be due to different phytochemical constituents. The results of the present study scientifically support the folklore pertaining to the medicinal properties of *Phaseolus semierectus*.

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