

STUDY ON ANTIPYRETIC ACTIVITY OF EXTRACTS OF BERGENIA LIGULATA WALL**NARDEV SINGH,*¹ ATUL K GUPTA ², VIJAY JUYAL ³ AND RENU CHETTRI.¹**¹Division of Pharma. Sciences, S. G. R. R. I. T. S., Patel Nagar, Dehradun (UK).²Department of Chemistry, S.G. R. R. P. G. College, Dehradun (UK).³Department of Pharmacy, Kumaun University, Nanital, (UK).***Corresponding Author**

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ABSTRACT

The effect of different extract from *Bergenia ligulata Wall* in yeast induced fever in albino rats of wistar strain were assessed for antipyretic activity. Plant extracts were administered at the doses of 300 & 500 mg/kg body weight. The standard drug used was paracetamol (200mg/kg.p.o). Rectal temperature of experimental animals was recorded at a time interval of 1hrs, 2hrs, 3hrs, 4hrs & 5hrs after drug administration for evaluation of antipyretic activity. The ethanolic extract of roots and rhizomes of *Bergenia ligulata Wall* at a dose of (500mg/kg.p.o) decreased the yeast induced fever in experimental animals.

KEY WORDS

Bergenia ligulata Wall, extract, antipyretic, experimental animals.

INTRODUCTION

Bergenia ligulata Wall a perennial herb with thick rootstock occurs in temperate regions from Kashmir region to Bhutan. It is found in the Himalayas between the altitudes of 2000-2500 meters. The main chemical constituents identified of the plant *Bergenia ligulata Wall* are bergenin, β -sitosterol, β -sitosterol-D-glucoside, (Jain and Gupta, 1962, Bhat et. al 1974), leucocyanidin, gallic acid, methyl gallate, catechin (Dixit and Srivastava, 1989). The rhizome of *Bergenia ligulata Wall* contains gallic acid, mucilage, wax,

glucoside, albumin and starch (Pandey, Kirtikar and Basu, 1996). The roots of *Bergenia ligulata* are used as an antidiabetic drug, diuretic, astringent, cardiogenic, wound healer, expectorant, antipyretic and anti-haemorrhoidal (Pandey, Kirtikar and Basu, 1996). The increasing frequency of intake of NSAID and their reported common side effects, there is a need to focus on the scientific exploration of potential herbal drugs having fewer side effects. *Bergenia ligulata Wall* explore very little for pharmacological evaluation, hence an effort has been made to establish the antipyretic activity.

MATERIAL AND METHODS

Plant material: The fresh plants of *Bergenia ligulata* Wall were collected in January from hilly areas of Dehradun, Uttarakhand, authenticated by Dr. Santosh Kumar Agarwal, Reader and Head, P.G Department of Botany, D.B.S (PG) College, Dehradun. A voucher specimen of the plant has been made and deposited at departmental herbarium. The roots, rhizomes & leaves of *Bergenia ligulata* Wall were dried in shade and subjected to reduction to coarse powder using grinding mill. The coarse powder of whole plant was extracted in hot water and then filtered to give the aqueous extract. The coarse powder of roots, rhizomes & leaves were extracted with ethanol (95%) in soxhlet extractor. The crude extracts were evaporated to dryness in rota evaporator under low temperature and reduced pressure. The yield of semisolid mass (w/w) was obtained as ethanol extract of roots (13.36%), ethanol extract of rhizomes (15.12%), ethanol extract of leaves (11.02%) & aqueous extract of whole plant (09.21%) with respect to the powdered material.

Animals: Wistar albino rats, weighing 120-150 g, were used for evaluation of antipyretic activity. All the animals were housed in polypropylene cages at room temperature fed on standard pellet diet and water *ad libitum*. The Institutional Animals Ethics Committee approved all the experimental protocols.

Acute toxicity study: Acute toxicity studies were carried out for all the extracts of *Bergenia ligulata* Wall on healthy swiss albino mice of body weight 25-35g by using Up and Down or Stair case method (Ghosh M.N, (1984). All the animals were housed in polypropylene cages at room temperature fed on standard pellet diet and water *ad libitum*. The maximum non-lethal dose for all the extracts were found to be 5g/ kg- body weight.

Plant Extract: The suspension of the all the extracts of *Bergenia ligulata* Wall was prepared in 5% gum acacia & employed for assessment of antipyretic activity at the dose of (300 & 500mg/ kg- body weight), Singh N et al. (2009).

Standard Drug: Paracetamol tablet was purchased from local market manufactured by Ind-Swift Limited, Parwanoo, Himachal Pradesh, made into powder in a mortar pestle and add to it 5% gum acacia. This solution was attributed to make a fine suspension and administered at a dose of 200 mg/ kg b.w, p.o) Rajeswara Rao P et al. (1997).

Antipyretic Activity: The assessment of antipyretic activity was carried out using brewer's yeast induced pyrexia method in wistar rats. Pyrexia was induced by injecting subcutaneously 10.0 ml / kg, b.w of 20% aqueous suspension of Brewer's yeast in normal saline (Rajeswara Rao P et al. (1997). The experimental animals were fasted overnight with water *ad libitum* before the experiments. The normal body temperature of each animal was measured by flexible thermister probe coated with the lubricant was inserted 3-4 cm deep into rectum and temperature was recorded. After 18 hrs of yeast injection the rectal temperature was recorded and the animals that showed an increase in temperature of at least 1.0 °C were used for study. All the experimental animals were administered with standard and test extracts orally and the rectal temperature was recorded at a time interval of 1hrs, 2hrs, 3hrs, 4hrs & 5hrs after drug administration.

After measurement of the body temperature animals were divided in six groups containing six animals each in group I-II & twelve each in group III-VI. Five percent gum acacia was used as vehicle for the administration of standard drug and plant extracts in all the groups. The schedule of the experiment was as follows-

Group I- Control animals, treated only with 5% gum acacia suspension at a dose of 10 ml /kg b.w, p.o).

Group II- Animals, treated with standard drug Paracetamol at a dose of 200 mg/kg b.w, p.o).

Group III- Animals, treated with ethanolic extract of roots of *Bergenia ligulata Wall* at a dose 300 & 500 mg / kg b.w, p.o).

Group IV- Animals, treated with ethanolic extract of rhizomes of *Bergenia ligulata Wall* at a dose 300 & 500 mg / kg b.w, p.o).

Group V- Animals, treated with ethanolic extract of leaves of *Bergenia ligulata Wall* at a dose 300 & 500 mg / kg b.w, p.o).

Group VI- Animals, treated with aqueous extract of whole plant *Bergenia ligulata Wall* at a dose 300 & 500 mg / kg b.w, p.o).

Statistical Analysis: The data were statistically analyzed using one-way ANOVA followed by Dunnett's test for individual comparison of groups with control. All values are expressed as mean \pm SEM, 'p' values were considered statistically significant when $p < 0.05$.

RESULTS AND DISCUSSION

The yeast induced pyrexia is called pathogenic fever, which is due to the production of prostaglandins (PGE₂) that set thermoregulatory center at a higher (Deepa PK et al. 2009). Paracetamol acts by blocking the effect of pyrogens on temperature sensitive neurons in the preoptic region of the hypothalamus, (Rajeswara Rao P et al. (1997). In the present study no acute toxicity was observed after oral administration even at the high dose of the extracts of *Bergenia ligulata Wall*, so it has potential safety for consumption. The experimental animals of group III, IV, V&VI treated with different extract of *Bergenia ligulata Wall* at a dose of 300 mg / kg b.w, p.o and group V & VI animals treated with ethanolic extract of leaves and aqueous extract of

whole plant at a dose of 500 mg / kg b.w, p.o did not showed significant change in body temperature. However the animals of group III & IV treated with ethanolic extract of roots and rhizomes at a dose of 500 mg / kg b.w, p.o decrease the fever induced by yeast in rats up to 5 hrs (Table no.-1). The response was comparable to that of antipyretic activity of Paracetamol used as standard antipyretic drug. On the basis of observation of data obtained from the present study we can say that the ethanolic extract of both roots and rhizome of plant showing significant antipyretic activity at 500 mg / kg b.w.

Mutalik et al. (2003) suggested that the antipyretic effect of *Solanum melongena* could be attributed to the presence of Flavonoids. Hajare et al. (2000) reported antipyretic effect of *Dalbergia species*, which may be attributed to the presence of flavonoids. The phytochemical analysis of ethanolic extract of roots and rhizomes of *Bergenia ligulata Wall* revealed the presence of steroids, alkaloids, Flavonoids and terpenoids, which may be responsible for the antipyretic activity of the plant.

Table 1.
Effect of different extract of *Bergenia ligulata* Wall and Paracetamol on brewer's yeast induced pyrexia in experimental animals.

Groups	Dose (mg/kg, b.wt .p.o)	Normal rectal temperature before yeast administration (°C)	Rectal temperature after 18 hrs of yeast administration (°C)	Rectal temperature at different time intervals (°C)				
				1 st hrs	2 nd hrs	3 rd hrs	4 th hrs	5 th hrs
Group - I	Saline 10 ml/kg	36.82 ± 0.464	39.10 ± 0.380	39.20 ± 0.439	39.35± 0.428	38.98 ± 0.341	38.91 ± 0.361	38.88± 0.383
Group – II	200mg/kg	36.96 ± 0.387	38.87 ± 0.475	38.29 ± 0.446	37.84± 0.559	37.63 ± 0.560	37.11 ± 0.690 *	37.02± 0.422**
Group –III	300 mg/kg	36.94 ± 0.383	38.15 ± 0.335	38.00 ± 0.383	37.85± 0.414	37.64 ± 0.313	37.64 ± 0.313	37.55 ± 0.273
	500 mg/kg	36.97 ± 0.373	39.27 ± 0.504	38.22 ± 0.333	38.15± 0.404	37.92 ± 0.217	36.97 ± 0.371 *	36.95± 0.369**
Group - IV	300 mg/kg	36.94 ± 0.383	38.08 ± 0.327	38.08 ± 0.327	38.00± 0.345	37.81 ± 0.451	37.60 ± 0.456	37.53 ± 0.484
	500 mg/kg	36.93 ± 0.378	39.09 ± 0.375	38.32 ± 0.389	37.75± 0.426	37.45 ± 0.520	37.33 ± 0.512 *	37.21± 0.476**
Group –V	300 mg/kg	36.67 ± 0.448	37.44 ± 0.383	37.74 ± 0.470	37.62± 0.433	37.61 ± 0.439	37.58 ± 0.445	37.56 ± 0.453
	500 mg/kg	36.80 ± 0.463	37.99 ± 0.470	37.95 ± 0.481	37.85± 0.419	37.66 ± 0.522	37.55 ± 0.459	37.48± 0.419
Group -VI	300 mg/kg	36.72 ± 0.397	38.24 ± 0.494	38.24 ± 0.494	38.14± 0.419	38.02 ± 0.487	37.93 ± 0.503	37.87 ± 0.627
	500 mg/kg	36.64 ± 0.441	37.72 ± 0.375	37.68 ± 0.343	37.79± 0.316	37.83 ± 0.459	37.71 ± 0.383	37.69 ± 0.388

Values are mean ± S.E.M, One way ANOVA (n=6), Experimental groups were compared with control (Group-I), *P<0.05, **P<0.01.

CONCLUSION

The present study indicates that *Bergenia ligulata* Wall could play an important role in the management of fever. As the human being thinks of such drug which are safe, economic having low cost of production, wide distribution and easily available. We may conclude that the ethanolic extract of roots and rhizomes of *Bergenia ligulata* Wall could be useful and safe if we will used it as antipyretic. Further study is in progress to isolate and characterized the active principle responsible for the activity.

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