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**Research Article**

# HEPATOPROTECTIVE EFFECT OF *BOERHAVIA REPENS* ON RATS EXPOSED TO PARACETAMOL

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**ABSTRACT**

Liver is a vital organ in human body and the site for metabolism and excretion. Liver diseases are the chief problem worldwide. Herbal drugs are the best therapeutic for these disease. Hence in the present work the hepatoprotective activity of the medicinal herb *Boerhaviarepens* was evaluated. 5 groups of rats were maintained as Control, Paracetamol induced, Silymarin, 100 mg Extract group and 200 mg extract treated groups. On the 15 th day blood was collected by intra cardiac puncture for the study of serum parameters liked SGOT,SGPT, bilirubin, albumin, total protein, ALP, cholesterol. The decrease levels of SGOT, SGPT, Bill.-T, Bill.-D, Albumin, ALP, Total protein and Cholesterol in the treated rats were an indication of the hepatoprotective activity of extract.



## INTRODUCTION

Liver diseases are considered as some of the fatal disease and one of the causes of high death rate in the world today (Ahsan 2009).Liver diseases are mainly caused by toxic chemicals, excess consumption of alcohol, infection and autoimmune disorders. Most of the hepatotoxic chemicals damage liver cells primartily by producing reactive species which form covalent bond with the lipids of the tissue.

Medicinal plants are playing very active role in traditional medicines for the treatment of various ailments (Mohammad *etal.,*2008).Liver protective plants contain a variety of chemical constituents like phenols, coumarins, lignans, essential oil, monoterpenes, carotinoids, glycosides, flavanoids, organic acids, lipids, alkaloids and xanthenes (Sharma *et at.,*2002).

*Boerhaviarepens* is an annual to perennial, prostrate or straggling herb, with stems up to 60cm long. The plant has a slender taproot and a stem that is few to much-branched. It also has the potential to be used to cover the soil and protect it from erosion. The plant is widely used, mainly in India, for its medicinal virtues. It is harvested from the wild, mainly for medicinal use, but also for local use as a food. In the present work the evaluation of hepatoprotective activity of *Boerhaviarepens* was undertaken.

## MATERIALS & METHODS

### *Preparation of plant extract*

The whole plant of *Boerhaviarepens* was collected from the Campus of Government Vidarbha Institute of Science and Humanities, Amravati (Maharashtra). The plant materials were dried under shade and grinded to a coarse powder. Then the air dried coarsely powdered plant material, were extracted with ethanol in a Soxhletapparatus, concentrated and dried under reduced pressure in a large petridish. The dried extract was stored in airtight container in refrigerator below 10ºC until experimental testing (Thimmaiah, 2004).

### *Procurement, maintenance and acclimatization of animals*

Wistar albino rats (200-220 gm) used for the experiment were purchased from the animal house of SudhakarraoNaik Institute of Pharmacy, Pusad (Maharashtra) and maintained in animal house of Government Vidarbha Institute of Science and Humanities, Zoology Department, Amravati (Maharashtra). All the rats were kept in standard plastic rat cages with stainless steel coverlids and wheat straw was used as bedding material.

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The animals were facilitated with standard environmental condition of photoperiod (12:12hr dark: light cycle) and temperature (25±2ºC). They were provided with commercial rat feed and water given *ad libitum*. The animals were habituated to laboratory conditions for 15 days prior to the experimental protocols to minimize any non-specific stress.

***Selection of animals for experiments***

In each experiment thirty adult, healthy male albino rats of Wistar strain which were three months of age and weighing about 200-220gm. were selected. The experimental animals were divided into five groups ($G_1$, $G_2$, $G_3$, $G_4$, and $G_5$) containing Six animals each. As per the treatment plan first group served as a control and the rest served as experimental groups.

***Acute toxicity test***

***Toxicity test***

Adult albino male rat were divided into four groups i.e. containing six animals in each group**.** Acute toxicity study was performed as described by Turner (1971). The rat were fasted for eighteen hours, the prepared drug was administrated orally at three different doses 500,1000 and 1500 mg/kg body weight, respectively to different groups of rat separately. Control rats received the vehicle (distilled water) only. The animals were observed for 72 hrs for behavioral changes and mortality. As there was no mortality seen at this dose level, the procedure was repeated by further increasing the dose (2000 mg/kg) using fresh animals.

***Treatment protocol: (Experimental design)***

Overnight fasted, healthy rats were randomly divided into five groups (6 rats per group)

***Group I:*** (Control group) / (Normal control) received oral dose of distilled water (1ml each) for15 days.

***Group II:*** (Toxic control) Paracetamol control group, received Paracetamol dissolved in normal saline (NaCl 0.9%) orally for 15 days (Parthsarthy, *et al*., 2007).

***Group III:*** **(**Standard group) received Silymarin and in addition received Paracetamol dissolved in normal saline orally for 15 days.

***Group IV:*** (Extract 100 group) received 100 mg/kg alcoholic extract of plant parts and in addition Paracetamol dissolved in normal saline orally for 15 days.

***Group V:*** (Extract 200 group) Received 200 mg/kg of alcoholic extract of plant parts and in addition Paracetamol dissolved in normal saline orally for 15 days.

***Preparation of samples for biochemical studies***

After administration of the last dose of the treatment, blood samples were collected on 15$^{th}$ day in case of chronic liver damage experiments. All rats were sacrificed by cervical dislocation and blood was collected by intracardiac puncture. The blood was kept for 30 minutes without disturbing. The clot was dispersed with glass rod and then centrifuged for 15-20 minutes at 2000 r.p.m. to separate serum.

***Assessment of hepatoprotective activity***

***Biochemical investigation***

***Biochemical evaluation:*** The serum of each animal of all experimental groups of rats was used for estimation of various biochemical parameters to determine the functional state of the liver.

**Statistical Analysis**

The result was expressed as mean ± SEM (Standard error of mean) for each parameter. The statistical analysis was done by using Student t-test for estimating variation in set of data. Data was analysed to determine the significant difference of result between the treated and control groups. The statistically significant level was taken as described by Khan and Khanum (2008).

## OBSERVATION AND RESULT

***Acute toxicity study of Boerhaviarepens whole plants extract***

No mortality and changes in behaviour were observed in all the treated and control group of rat up to dose of 2000 mg/kg body weight *Boerhaviarepens* whole plants extract. Hence 200 mg/kg body weight plant extract was used as the maximum dose for hepatoprotective study.

## RESULT AND DISCUSSION

Table 1 shows the hepatoprotective activity of alcoholic extract of *Boerhaviarepens* (whole plant) on Paracetamol induced hepatotoxicity in rats. Paracetamol treatment showed an increased level of Bilirubin T Bilirubin D, SGOT,SGPT, Total protein, albumin, ALP and Cholesterol as compared to the control group.

However in the group of rats pre-treated with Silymarin the levels of Bili. T, Bili. D, SGOT, SGPT total protein, albumin and ALP were considerably lowered as compared to paracetamol group. Similarly the animals treated with alcoholic extract of *Boerhaviarepens* showed statistically significant ($p<0.01$) hepatoprotective activity against paracetamol induced hepatotoxicity in rats, which is comparable to the standard drug

**Table No 1** Effect of alcoholic extract of *Boerhaviarepens* whole plant on Paracetamol induced hepatotoxicity in rats.

| | Bili –T mg/dl | Bili –D mg/dl | SGOT Units/ml | SGPT Units/ml | Total Protein mg/dl | Albumin mg/dl | ALP Unit/ml | Cholesterol mg/dl |
|---|---|---|---|---|---|---|---|---|
| Control | 0.78±0.3 | 8.23±0.33 | 215.18±1.1 | 84.23±0.7 | 7.77±0.45 | 3.38±0.1 | 81.66±0.92 | 184.13±1.7 |
| Paracetamol | 1.43±0.18*** | 10.5±0.43*** | 297.8±7.6*** | 111.7±2.4*** | 11.85±0.58*** | 4.7±0.28*** | 98.41±1.8*** | 212.7±3.5*** |
| Silymarin | 1.18±0.08*** | 8.37±0.26 | 251.40±1.99*** | 84.83±0.68 | 8.13±0.34 | 3.60±0.29 | 85.86±1.46*** | 190.6±1.6*** |
| Ext. 1 150Mg/Kg | 0.99±0.03*** | 10.00±0.39*** | 254.06±13.4** | 96.06±1.05*** | 9.2±0.50** | 3.4±0.48 | 86.53±0.95*** | 203.81±2.79*** |
| Ext. 2 200Mg/Kg | 0.95±0.26*** | 9.50±0.34*** | 272.8±2.43*** | 93.80±0.67*** | 8.24±0.47 | 3.85±0.3 | 85.66±0.8*** | 195.2±1.5*** |

Value in mean ± S.E (Standard Error), n=6,*P<0.05,**P<0.02, ***P<0.01, when compared between group.

Silymarin. These finding suggested the extract administered has significantly neutralized the toxic effects of paracetamol and helped in regenerating the hepatocytes.

In the assessment of liver damage by paracetamol (acetaminophen) the determination of enzyme levels such as SGOT, SGPT is largely used. Necrosis or membrane damage releases the enzyme into systemic circulation and hence it can be measured in the serum. Elevated levels of serum enzymes are indicative of cellular leakage and loss of functional integrity of cell membrane in liver (Droatman, 1978).

Increase in serum level of ALP is suggested to be due to increased synthesis, in presence of increasing biliary pressure (Muriel, 1992). The reversal of increased serum enzymes in acetaminophen- induced liver damage, by leaves and steam extract of *Boerhaviarepens* may be due to its membrane stabilizing activity. This is agreement with the commonly accepted that the serum levels of transaminases return to normal with the healing of hepatic parenchyma and the regeneration of hepatocytes (Thabrew, 1987).

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