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Research Article

# ANTIOXIDANT ACTIVITY OF *GARCINIA GUMMI* GUTTA (LINN) IN PARACETAMOL INTOXICATED WISTAR ALBINO RATS

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**ABSTRACT**
The study was carried out to determine antioxidant activity of methanolic extract of *Garcinia gummi gutta* fruit in the selective *in vivo* model system using Wistar albino rats. The experiment was comprised of five groups such as Healthy control, Disease control (Paracetamol treated), Positive control (Silymarin treated), test groups *G. gutta* lower dose(250mg/kg b.wt) and higher dose (500 mg/kg b.wt). The study period was 10 days and the biochemical profile including SGOT, ALKP, Total protein and antioxidant enzymes Superoxide dismutase, Glutathione peroxidase and Glutathione reductase levels were evaluated in blood and tissue samples (liver, kidney, heart) of all the experimental animals. The study proved that there was a significant improvement of antioxidant enzyme levels in the *G. gutta* treated groups as compared to the control groups and the efficacy was found to be dose dependent. The study proved the antioxidant activity of *G. gutta* extract and further study on characterization of phytoconstituents is under progress for harnessing *G. gutta* as a drug formulation.
**Keywords**: antioxidant activity, *Garcinia gummi gutta*, Glutathione, SOD, Peroxidase

## INTRODUCTION

In the past few years natural antioxidant have generated considerable interest in preventive medicine. There is increasing evidence that oxidative stress, defined as an imbalance between oxidants and antioxidant in favour of the former, leads to many biochemical changes and is an important causative factor in several human chronic diseases, such as atherosclerosis and cardiovascular diseases, mutagenesis and cancer, several neurodegenerative disorders, and the ageing process [1-3].

*Garcinia gummi gutta* is a hard wood and a fruit free belongs to the family Guttiferae. *Garcinia gummi gutta* commonly knows as Gambooge, Brindle berry is a subtropical species of Garcinus native Indonesia. It is indigenous in the deciduous and semi ever-green forest of the southern Western ghats of India. The yellowish fruit is pumpkin shaped. Gambooge tree is also grown in homesteads mainly for its fruits that are used in food preparations [4].

In the present study, an attempt has been made to examine the *in vivo* antioxidant activity of *Garcinia gummi gutta* fruit in the paracetamol challenged Wistar albino rats.

## MATERIALS AND METHODS

The plant material was collected from the local market of Thrissur and taxonomical identification was done at Pharmacy division of NRIP, Cheruthuruthy.

**Animals**- Adult Wistar albino rats (male and female) were obtained from Agricultural University, Mannuthy, Thrissur. Animals of either sex weighing between 150-200 g were used for the present study. The animals were housed in polypropylene cages ( 3 animals per cage) and maintained under standard laboratory conditions ($25^0 \pm 2^0$C) with 14 hr light/dark cycle. Food and water were provided *ad libitum*. The rats were acclimatized to laboratory condition for 30 days before commencement of experiment. All procedure of animal experimentation was reviewed and approved by the Institute Animal Ethical Committee, NRIP, Cheruthuruthy.

**Chemicals-** Methanol from Qualigens, paracetamol from GSK Mumbai, Silymarin from Serum Institute of India, NaCl from Merck, SGOT,SGPT, ALKP and total protein from Transasia, Mumbai, SOD, Glutathione peroxidase and Glutathione reductase from Randox labs.

### Methodology

*Garcinia gummi gutta* fruit was extracted by soxhlet extraction apparatus using hot methanol. The experimental animals were divided in five groups consisting of six animals each. The first group consisted of normal healthy control rats, which received single daily dose of distilled water on all 10 days. The paracetamol group (Disease control) received single daily dose of distilled water for seven days and single dose of Paracetamol (500mg/kg b.wt) on 8th day. The third group (Positive control) was treated with standard drug Silymarin (100mg/kg b.wt) on all seven days and Paracetamol on 8th day. The fourth group and fifth group (test drug lower dose and higher dose) were treated with test extracts of low and high dose(250mg/kg b.wt and 500 mg/kg b.wt) respectively on all 10 days along with paracetamol on 8th day [5]. At the end of the experiment, blood and tissue samples were collected after euthanasia. 10% wt/v tissue homogenate was prepared in 0.9% saline and centrifuged at 10000 rpm, 15 minutes at $4^0$C. The supernatant was taken for the experimentation. The biochemical investigations including SGOT, ALKP, total protein, SOD, GSH, GPx levels were evaluated as per the standard protocols [6-12].

## RESULTS

Results of the present study showed that methanolic extract of *Garcinia gummi gutta* fruit was having significant antioxidant activity in the experimental animal model systems. The *G. gutta* extract also showed anti hepatotoxic activity as compared to the paracetamol treated diseases control groups.

## DISCUSSION

The liver marker enzymes including SGOT, ALKP and Total protein levels were significantly increased in the disease control groups as compared to the healthy control, whereas the *G. gutta* treated groups showed significantly decreased levels of the SGOT, ALKP and total protein as compared to the Disease group (Table .1). The antioxidant enzymes superoxide dismutase, glutathione peroxidase and glutathione reductase levels were evaluated in the blood samples and tissue samples of all the experimental groups (Table.2). The status of SOD, GPx and GSH were found to be significantly decreased in blood samples of disease control group but marked improvement of the same in the *G. gutta* treated groups. Similarly, the antioxidant enzyme levels in the liver, kidney and heart tissue

samples have been significantly increased in the *G. gutta* treated groups (Figure1-3). The efficacy of the extract is also found to be dose dependent.

## CONCLUSION

In conclusion, the present study showed that the methanolic extract of *Garcinia gummi gutta* fruit was having significant antioxidant potential in the *in vivo* model system. The further study on phytochemical constituents and isolation and characterization of active principles of the extract is under progress.

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**Table.1. Liver marker profile in the experimental animals.**

| Experimental Groups | Biochemical parameters in Blood samples | | |
|---|---|---|---|
| | SGOT | ALKP | Total Protein |
| Healthy Control | 133.56 ± 21.61 | 91.82 ± 13.64 | 8.72 ± 0.75 |
| Disease Control | 358.47 ± 22.14* | 266.77 ± 9.75** | 7.79 ± 10.83* |
| Silymarin Treated | 164.91 ± 23.85* | 117.36 ± 16.47** | 7.95 ± 1.16* |
| *G. gutta* Lower dose | 266.78 ± 4.55* | 188.48 ± 35.80* | 6.9 ± 0.49* |
| *G. gutta* Higher dose | 231.72 ± 21.14* | 139.29 ± 14.42** | 6.8 ± 0.38* |

Values are Mean ± SEM, n=6. *P < 0.05, **p<0.01 when compared with disease control.

**Table. 2. Superoxide dismutase level in different tissue samples of experimental animals.**

| Parameter | Tissues | Healthy Control | Disease Control | Silymarin Treated | *G. gutta* Lower dose | *G. gutta* Higher dose |
|---|---|---|---|---|---|---|
| SOD (U/mg protein) | Liver | 9.11 ± 0.63 | 4.11 ± 0.21* | 7.65 ± 0.15* | 7.16 ± 0.38* | 7.48 ± 0.21* |
| | Kidney | 6.15 ± 0.36 | 3.86 ± 0.12* | 5.80 ± 0.74** | 5.63 ± 0.24* | 5.36 ± 0.25** |
| | Heart | 22.60 ± 4.30 | 10.78 ± 1.25* | 19.81 ± 3.70** | 21.57 ± 1.25 | 20.38 ± 2.63 |

Values are Mean ± SEM, n=6. *P < 0.05, **p<0.01 when compared with disease control.

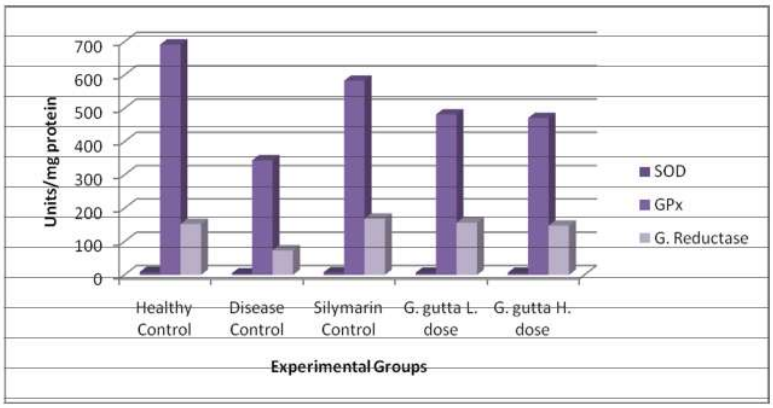


**Figure.1. Antioxidant enzyme levels in blood samples of experimental animals.**

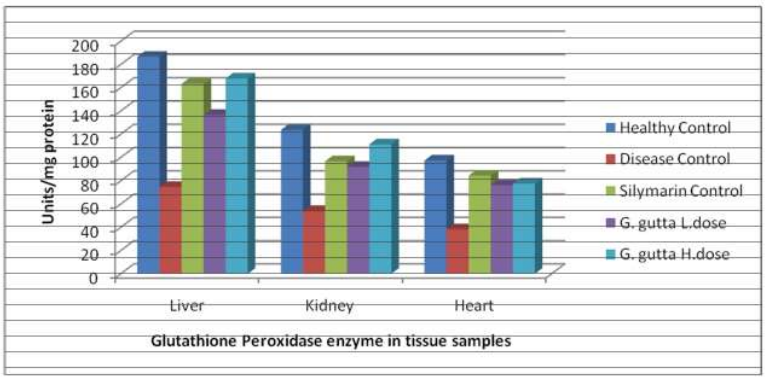


**Figure.2. Antioxidant enzyme GPx status in tissue samples of experimental animals**.

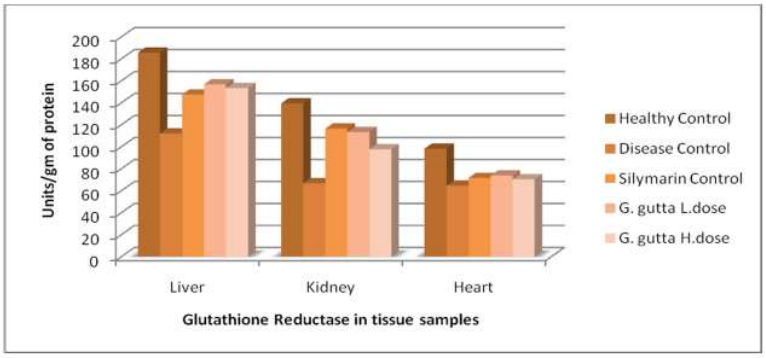


**Figure.3. Glutathione reductase levels in tissue samples of experimental animals.**

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