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Hepatoprotective Study of *Grewia Asiatica*

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Abstract

Introduction: Plants have always been a very good source of drugs. Liver disorders are nearly one of the lethal ailments in the globe now a day. Hence, in the present study, we intend to evaluate the hepatoprotective study of *Grewia asiatica*. **Materials and Methods:** *G. asiatica* was collected from hills of Tirupati, dried, and powdered. Healthy male Wistar albino rats with paracetamol and CCl_4-induced liver damage were studied on day 1 and 7 for the serum glutamate oxaloacetate transaminase (SGOT), serum alanine transaminase (SGPT), ALKP, and total protein levels after the extract was given at different concentrations. The results were compared histologically. **Results:** The hepatoprotective effect of the plant extract and combination also proved by measuring the liver related parameters such as SGOT, SGPT, ALKP, and total protein which were elevated in disease but significantly reduce in standard and plant extract treated groups. **Conclusion:** *G. asiatica* plant extracts were safe for treating the hepatic diseases and did not show any toxicities or drug-related interactions but future pharmacokinetic studies required to validate the given result.

Keywords: *Grewia asiatica*, Hepatoprotective property, SGOT, Triglycerides

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Introduction

Liver is one of the important parts in human being body and foremost important organ for absorption and metabolic elimination or conversion of bio as well as exogenous components. The foremost important of the liver is to metabolite carbohydrates, proteins and fats, decontamination, excretion of bile and storage hepatic, is a decisive feature for inclusive wellbeing. Nevertheless, it is uninterruptedly and peculiarly uncovered to conservational poisons compounds, and mistreated by deprived drug behaviors, and alcohol and prearranged and over the counter medications which ultimately leads to numerous liver disease such as hepatic inflammation of liver, cirrhosis, and liver disease due to chronic alcohol consumption.[1-3]

Thus, liver disorders are nearly one of the lethal ailments in the ecosphere, nowadays, they stance a solemn encounter to intercontinental civic well-being. There are few medications presented for the cure and management of hepatic complaints. Furthermore, several traditional therapies from plant source are established for their probable antioxidant and liver protective actions in investigational animal models.[4]

Hepatoprotective herbal medicine comprehends a variable number of phytoconstituents. Solvent extracts of numerous plants are similarly associated in the treatment of disorders of liver.[5,6] The routine allopathic medicines prescribed may have noted side effects. Hence, in the present study, we intend to evaluate the hepatoprotective study of *Grewia asiatica*.

Materials and Methods

Collection of Plant and Plant Material

G. asiatica was collected from the hilly areas of Tirupati, the collected plant materials were subjected for cleaning and drying, later mechanical grinding procedures were used to give powder plant material. This collected powder material was subjected for preliminary phytochemical analysis where all the plant materials were extracted with solvent alcohol then the extracts were used for phytochemical screening to reveal the presence of type of phytochemical present in the selected plant extracts. Later, these extracts were further used for pharmacological investigation. The selected extracts were also used for the evaluation of total flavonoids content and phenolic content. The total flavonoids and phenolic contents of the selected plant extracts were found to be 47.89 mg/mL quercetin and 39.56 gallic acid mg/mL, respectively.

The alcoholic extracts of *G. asiatica* plants were evaluated for the gross behavioral and acute toxicity studies on Swiss albino mice by following guidelines provided by OECD. These results revel that the extracts were safe even at highest dose 2000 mg/kg based on this 1/10th of safe dose, one submaximal dose and one supramaximal doses were selected to carry out pharmacological screening for their unexplored folklore claims using selected *in vivo* pharmacological methods or animal models.

Source of Animals

Healthy male Wistar albino rats (150–180 g) of age 8–10 weeks were obtained from Hyderabad. The experiments and procedures used in study were approved by the Institutional Animal Ethics committee.[7,8]

Statistical Analysis

For each set of experiments where two or more than 2 groups were compared, an analysis of variance (ANOVA) test was used to

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determine the significance of differences. Statistical analysis was done by one-way ANOVA followed by Dunnett's post-analysis using GraphPad Prism version 5.0, USA. All the values were presented as mean ± SEM. The significance of difference between averages was determined and the data obtained from present study were analyzed for *P*-value. $P < 0.05$ was taken as the criterion of statistically significance and $P < 0.001$ was considered highly statistically significant.

Results

Effect on Lipid Profile

The result of the current study presents that there is a constant rise in serum lipid parameters such as serum cholesterol, triglycerides, low-density lipoprotein (LDL) cholesterol, and very-low-density lipoprotein (VLDL) cholesterol and a constant decline observed in serum high-density lipoprotein (HDL) cholesterol in the animals, which were treated hepatotoxic inducing agents over a period of 8 days. When these results compared with the results of standard drug treated group, the values were significant, where a significant decline in the serum cholesterol, triglycerides, LDL cholesterol, and VLDL cholesterol and a sharp increase in HDL cholesterol. The serum lipid levels of all drug extract treated animals were found to be comparable as that of standard drug treated animal group. The LDL cholesterol and total cholesterol were institute to be noticeable at the lower doses.

When the plant extracts given in the form of formulation or coadministered at low doses a potent synergistic activity observed by sharp decline in the serum cholesterol, triglycerides, LDL cholesterol, and VLDL cholesterol and significant increase in the serum levels of HDL cholesterol, at the same time, all these results were almost similar when compare with that of results of standard group animal serum values. Hence, these results were clear indication for the safe use of the extracts in combination, at the same time, it does not contain any drug-related interaction, but it is need to generate its pharmacokinetic data to justify the given statements (Tables 1-2).

Hepatoprotective Activity

The selected plan extracts at the higher doses 400 mg/kg weight provided a significant protective effect in the drug-induced hepatic damage, when compared with the diseases control group. The histopathological studies conducted on the same animals on day 1 of the treatment, where a constant and good hepatic control was observed in the extract treated group which received at a dose of 400 mg/kg weight. It is also clear that plant extracts regain the normal live architecture, whereas some cells showed mild degree of vacuolation with single prominent pyknotic nucleus [Figures 1-8].

Table 1: Hepatoprotective studies CCl_4-induced model

	Day-1			
Group	*SGOT*	*SGPT*	*TP*	*ALP*
Test-1				
100 mg	112.3±5.34	35.76±4.52	5.78±0.34	75.78±12.56
200 mg	111.4±2.98	34.75±2.46	5.89±0.23	75.72±12.89
400 mg	110.8±2.78	33.82±3.98	5.96±0.13	74.67±3.98

n=3, mean±SEM (>0.005)

Table 2: Hepatoprotective studies paracetamol-induced model day-1

	Day-1			
Group	*SGOT*	*SGPT*	*TP*	*ALP*
Test-1				
100 mg	111.6±3.78	*37.45±3.69	6.59±0.54	207.6±4.90
200 mg	111.5±5.17	37.43±5.49	*6.60±0.97	207.5±6.47
400 mg	*110.2±5.80	36.60±4.08	6.61±0.74	206.71±6.15

n=3, mean±SEM (>0.005)

Discussion

In the present day specific targeted and poor linking situations; ethnopharmacology and drugs from natural vegetative sources preserve crucial matter, for instance, several existing drugs demolish their beginning in ethnopharmacology. At present, there is a practical partiality with respect to ancient traditional and integrated health disciplines in research and practice coupled together. The natural and unadventurous stream in treatment journeying is ephemeral away from introverted molecule or solitary target style to amalgamations and copious target lines.[8,9]

Specific solvent extraction of selected plant powder results into plant extract with notable chemical secondary metabolites which possesses the wide number of pharmacological activities which were presently used to treatment various illness of the population.

The extracts of selected plants did not show any noxious or injurious impermanence up to 2000 mg/kg body weight by oral route of administration, so all extracts were reflected in category No. 5. The known behavioral signs such as change in skin color or texture, hair, eye movement, mucous secretions, breathing, autonomic symptoms, central nervous system changes, communicating variations, body jerks or movements, diarrhea, lassitude, and snooze were taken into the consideration. The onset of above said considerations and any type of obnoxious injuries were absent for next 3 days which will be consider as toxicity surveillance period. The absence of above signs indicates safe and harmlessness of all the selected plant extracts. Based on this toxicity study, 1/10th of safe dose was taken as medial dose and other two were one submaximal and supramaximal doses for investigation of desired pharmacological activity.

With the current day medication, no considerable effective treatment is still available to regulate hepatic diseases. The use of allopathic drugs or treatment methods carries numerous and serious adverse effects in the human system because of multiple effect possessed by the administered drugs. As a result of the above, there is an increase in demand or claim for the identification of novel therapeutic approaches which include introduction of novel hepatoprotective agents. The management of hepatic disease dispossessed of any side effect is an encounter to the system of medicine.[10-12]

Plants were considered a chief components and they have an important play role in the identification of novel hepatoprotective agents and the valuable manifold happenings reminiscent of manipulating metabolism by several mechanisms, avoiding, reestablishing neatness and role of cells, antioxidant, and free radical scavenging activities in plant-based medicines, suggest the invigorating prospect to advance them into innovative therapeutic approaches.[10,11]

Efficacy and efficiency of any hepatoprotective remedy and curative effect are relies on herb ability sinking the destructive

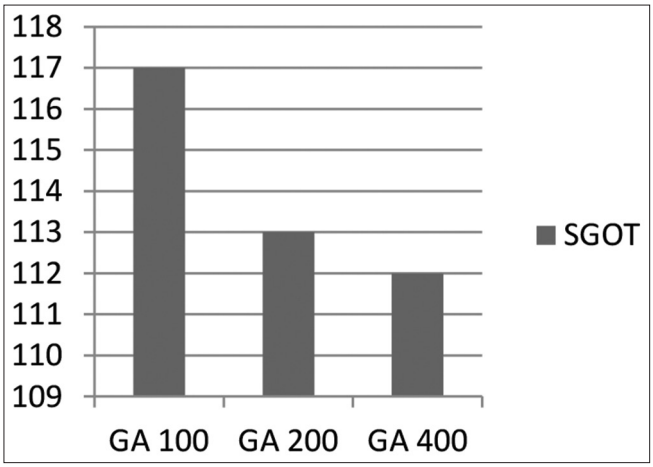

Figure 1: Glutamate oxaloacetate transaminase (SGOT) of GA

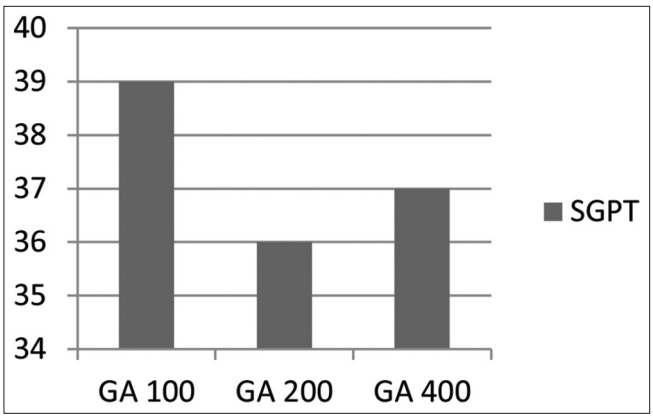

Figure 2: Serum alanine transaminase (SGPT) of Grewia Asiatica (GA)

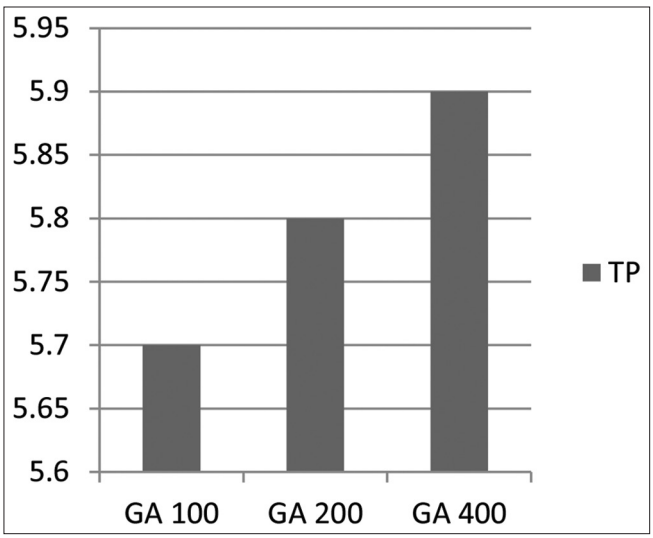

Figure 3: Total Proteins (TP) of Grewia Asiatica (GA)

possessions of liver damaging substances, to sustain the important liver biochemical mechanism.[12] Liver protecting function of all the extracts including in the form of formulation was evaluated in paracetamol and CCl_4-induced hepatic damage in experimental rats.

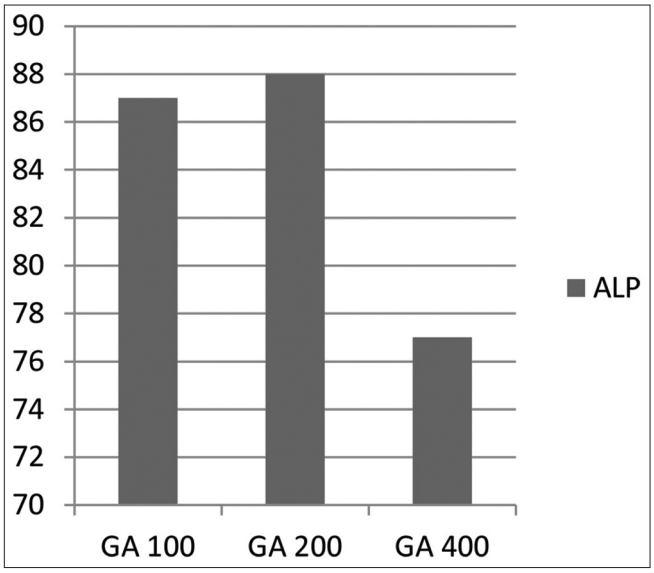

Figure 4: Alkaline phosphatase (ALP) of GA

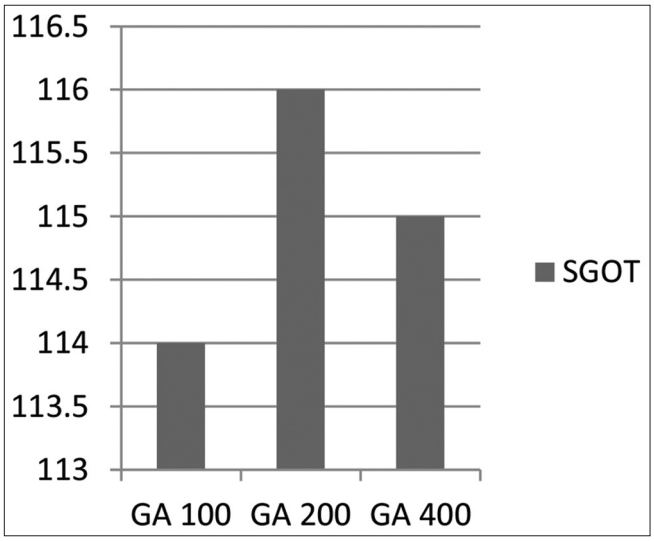

Figure 5: Glutamate oxaloacetate transaminase (SGOT) of Grewia Asiatica (GA)

All the animals which were administered with inducing agent exhibited a crucial structural impairment as established since higher planes of liver unequivocal enzyme adjuvant and elevated variations in sundry hepatic constrains. Protective or curative efficacy of plant extracts was dosage dependent and it is explained by constant reset of renewed amount of wide number of biological indicators, this potent hepatoprotection may be possible through affirmative activation of enzymes and renovation of hepatocytes which reestablishes the physical and structural integrity of the liver cells.[12,13]

At higher doses, the plant extracts showed a significant protective and curative effect in paracetamol and CCl4-induced liver damage when compare with disease control group. The histopathological studies were conducted on 1 day, where it is observed good damage control in high-dose extract treated groups. In histopathological studies, it is also observed that regains of normal liver architecture in large dose treated group.

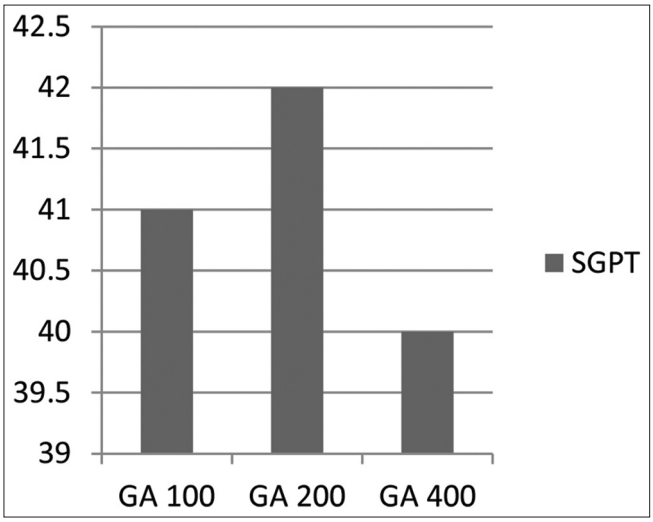

Figure 6: SGPT of GA

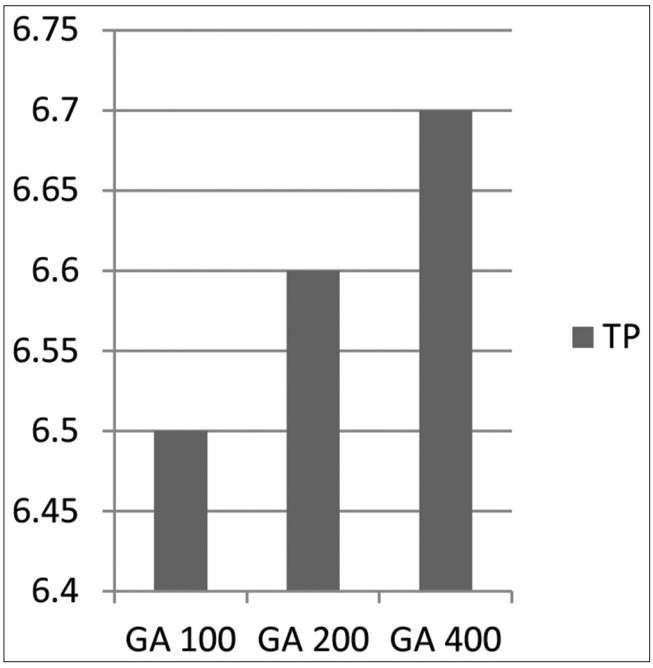

Figure 7: TP of GA

Some cells were observed at mild degree of vacuolation and single prominent pyknotic nucleus. These results also found good in when extracts were given in the combination. In this state, a significant synergistic effect found. The hepatoprotective effect of the plant extract and combination also proved by measuring the liver related parameters such as SGOT, SGPT, ALKP, and total protein which were elevated in disease but significantly reduce in standard and plant extract treated groups.

The protective effect of plant extracts detected by administration of muscularly designated that extracts may have capability to prevent and alleviate any seepage of biological marker or enzymes. Histopathological studies were conducted on day 1, which indicated good control in the extracts treated groups at high doses 400 mg/kg weight and in low dose combinations. However, reconstructive action also observed at low doses which

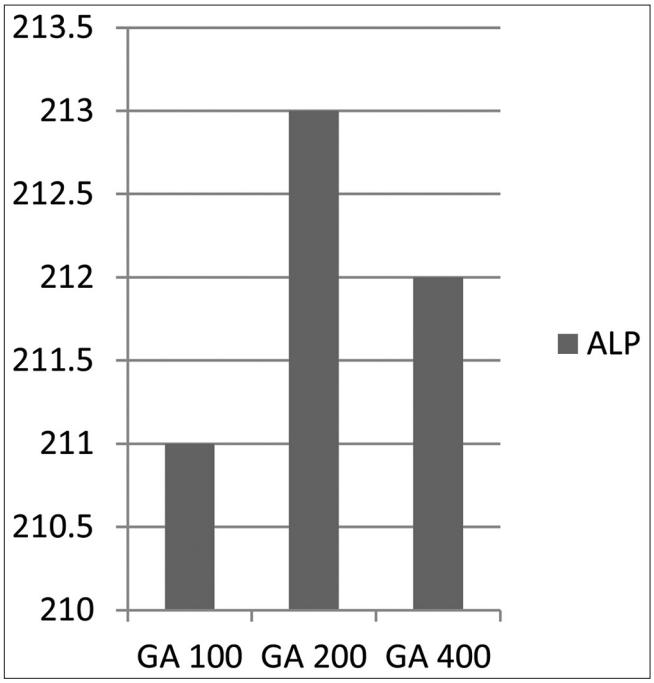

Figure 8: ALP of GA

are not too significant when compared with standard treated groups.

When extracts were administered in the form of combination, it was showed a potent synergistic activity on SGOT, SGPT, and ALK levels of the treated animals which were particularly similar to that of standard also. Hence, it is clear indication that all the plant extracts were safe to use them as a drug in alone as well as in combination and it is also evident that extract in combination not possesses any toxic or drug-related interactions but there is a need to generate pharmacokinetic data to prove the statements.[14,15]

Conclusion

G. asiatica plants showed significant hepatoprotective properties. The study also can be extended to work on the development and evaluation of suitable dosage form for hepatic diseases treatment with these newly identified herbs individually and also in their amalgamation to corroborate the synergistic mechanisms and pharmacokinetic studies.

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