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Syrup Formulation Incorporating Herbs for the Hepatotoxicity

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ABSTRACT

The liver is an important organ in the body that is responsible for the proper metabolism of food and drugs. It eliminates waste material and toxins from food with the help of the enzymes like cytochrome P450. *Ficus benghalensis* is a very well-known plant that is known for its pharmacological properties like antioxidant, hepatoprotective, immune-boosting, anti-diabetic etc. It also has properties like anti-hypertensive and anti-hyperlipidemic. It was already tested for the hepatoprotective activity, and the extract used was ethanol. *Psidium guava* is a local plant in tropical countries that are harvested for fruits, and all the plant parts have varied pharmacological activities like anti-diabetic, Anti-inflammatory, anti-hyperlipidemic etc. especially, the leaves of the plant have many significant uses like hepatoprotective which was investigated for the same using methanol extract. The extracts of the Ficus and Guava were incorporated into the syrup formulation, and it was tested for the activity against the hepatotoxicity induced due to the CCl4 and Paracetamol in the albino Wistar rats. The extract and formulation showed a better activity compared to the standard drug.

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INTRODUCTION

Ficus Benghalensis is a very well-known plant that is known for its pharmacological properties like antioxidant, hepatoprotective, immune-boosting, anti-diabetic etc. . It also has properties like anti-hypertensive and anti-hyperlipidemic. It was already tested for the hepatoprotective activity [1], and the extract used was ethanol.

Psidium guava is a local plant in tropical countries that are harvested for fruits, and all the plant parts have varied pharmacological activities like anti-diabetic, Anti-inflammatory, anti-hyperlipidemic etc. especially, the leaves of the plant have many significant uses like hepatoprotective [2] which was investigated for the same using methanol extract.

The liver is an important organ in the body that is responsible for the proper metabolism of food and drugs. It eliminates waste material and toxins from food with the help of enzymes like cytochrome P450 [3]. There are many drugs and chemicals when ingested into the body undergoes metabolism by the liver wherein the enzymes, transformation happens.

When the drugs enter the liver, they make some changes to the chemistry of the liver that recovers from the damage in the process of restoration. But if there is any permanent damage to the liver, the liver enzymes are permanently imbalanced causes many other functional and physiological problems [4]. So, given this, herbs have been a lot useful in treating and restoring the functions of the liver and also enable its regeneration capacity to a lot better extent.

The herbs are found to be significantly safer and also effective [5]. There are a lot of patent works also claiming the right over the molecules that are derived from the herbs that have hepatoprotective properties [6, 7]. Numerous formulations are herbal origin and are found effective in treating liver conditions like Hepatitis and liver failure. Till now, there were no alternatives for those herbal formulations.

In the current research, polyherbal formulation incorporating the herbal extracts of ficus and guava were extracted with water which was relatively safer than ethanol and methanol are prepared. This was investigated for the hepatoprotective activity.

EXTRACT PROCESS

The leaves of both the plants were collected and shade dried in May. These were dried for 4days and were powdered using a blender.

This powder was finely sieved and extracted using distilled water using maceration method. The macerate was let for soaking for three days with shaking frequently.

The extract was then filtered, and the filtrate was evaporated using a filter paper. This was dried and stored and named as FAE-20.8%w/w and GAE-19.4%. The extracts were weighed and mixed in the syrup base to lead a concentration of 200mg/ml.

TPC and TFC content

The phenol and flavonol content in the extracts was determined using the UV spectroscopy method [8]. The standard graphs of quercetin and gallic acid were determined, and the comparisons were made to determine the total phenol content in the extract and the total flavanol content.

Animals and acclimatization

The invivo screening of the activity was investigated in 2 methods. So the rats were used for the screening of the activity are albino Wistar rats. They weighed about 130-145gm in weight and were kept in air conditioning.

The animals were allowed to have free food and water and not given any food or water for one night before experimentation. They were divided into five groups which had 5animals in each group.

Group 1 was given with the normal saline and were not induced with any induction agents. Group 2 was given the induction agent in either of the methods.

Group3 was given the inducing agent and also the standard drug that is Silymarin 10mg/kg.

Group 4 was given the Extracts at a dose of 200mg/kg body weight.

Group 5 was given the prepared formulation at a dose that is equivalent to the 200mg of the extract.

CCl4-induced hepatotoxicity method

In the method, Carbon Tetra Chloride was used to induce the hepatotoxicity into the rats. The experiments were continued for four days.

The extracts and drugs were administered 30mins before the induction of the hepatotoxicity [9]. The inducing agent was given as carbon tetrachloride was given at 1.5ml per kg of the rats.

Paracetamol induced hepatotoxicity method.

Int his method, Paracetamol was used to induce the hepatotoxicity in the rats. 2% solution of the Paracetamol was prepared using distilled water. The dose of the Paracetamol was 2g/kg to induce the hepatotoxicity [10]. The induction of the Paracetamol was done 30mins after the extract administration of the drugs.

On the last day of the study, the rats were sacrificed, and the blood was withdrawn from the retro-orbital region and this blood was evaluated for the liver enzymes like SGOT. SGPT, SALP and TP, which were estimated in standard procedures as per standards [11].

RESULTS

The investigation of the formulation of the hepatoprotective formulation was perfumed in this study. The antioxidant and anti-inflammatory activities were responsible for the activity which was compared with the standard drug and crude extract. The total phenol content and total flavanol content were determined.

They have estimated as for FAE it was 132 mg of the Gallic acid equivalents per g of the extracts, and total flavonols were 49mg of the quercetin equivalents per gm of the extract. This was compared with the crude extract, which supports the antioxidant activity.

The hepatoprotective activity of the formulation was compared with the standard drug and the extract. The formulation was syrup, and it was proven excellent and effective in controlling the enzyme levels in both the methods of investigation of the hepatoprotection.

The extracts and formulation prevented the toxicity of the inducing agent. The SGOT levels and SGPT levels indicate the hepatotoxicity and their levels were significantly lowered with the extracts and formulations. Tables 1 and 2

Table 1: Activity of the formulation against CCl4

Groups	SGOT-(IU/L)	SGPT-(IU/L)	ALP-(IU/L)	Total bilirubin-(mg/dl)	Total protein-(mg/dl)
D.Water	127.62±7.14	64.02±9.24	176.03±13.45	3.05±0.67	6.34±3.73
Inducing agent	268.19±8.03	355.72±4.81	299.45±27.59	7.03±0.92	8.19±1.05
Silymarin	161.46±6.12*	68.50±10.25*	182.1±9.13*	4.12±0.70*	7.01±0.91*
Crude Extract	163.05±26.07*	102.04±11.02*	217.8±5.06*	3.438±2.04*	6.23±3.698
Syrup	174.71±19.15*	79.28±9.16*	198.62±10.4*	4.31±2.45*	8.35±1.62*

Table 2: Activity of the formulation against Paracetamol

Groups	SGOT-(IU/L)	SGPT-(IU/L)	ALP-(IU/L)	Total bilirubin-(mg/dl)	Total protein-(mg/dl)
D.Water	89.02±3.15	44.96±4.32	135.07±5.53	10.03±0.17	10.24±0.81
Inducing agent	153.68±+5.01	115.18±6.76	343.89±6.12	3.01±0.43	9.52±0.64
Silymarin	104.9±5.20*	56.43±4.31*	155.01±4.78*	0.94±0.86*	10.66±0.99*
Crude Extract	127.91±25.42*	59.52±6.13*	204.6±4.24*	4.45±0.69*	9.34±0.53*
Syrup	131.03±4.70*	62.4±4.05*	216.09±3.44*	0.93±0.31*	11.5±0.83*

CONCLUSION

The extracts of the Ficus and Guava were incorporated into the syrup formulation, and it was tested for the activity against the hepatotoxicity induced due to the CCl4 and Paracetamol in the albino Wistar rats. The extract and formulation showed a better activity compared to the standard drug.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest for this study.

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