



Research Article

A PHARMACOLOGICAL STUDY AND EVALUATION OF HEPATOPROTECTIVE ACTIVITY OF MERREMIA EMARGINATA IN WISTAR RATS

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ABSTRACT

Merremia emarginata whole plant was subjected to preliminary phytochemical investigation and was found that it possess alkaloids, steroids, glycosides, flavonoids, tannins, carbohydrates and proteins. The extracts prepared by using polar solvents have demonstrated the dose dependent Hepatoprotective activity. The Methanolic extract of *Merremia emarginata* whole plant has shown Hepatoprotective activity in various screening models. It has demonstrated the Hepatoprotective activity which was evident by showing the variation in the liver enzymes. Our study has justified the claim of native herbal practitioners that the plant extract is useful in treating the Liver disorders.

KEYWORDS: *Merremia emarginata*, Hepatoprotective activity, Liver disorder, Enzymes.

INTRODUCTION

Ailments like hepatic disorder and metabolic disorders (diabetes) are appearing as a major threat in the future. These diseases are major concern in front of researcher because contributing factors are increasing in developing world.

The present scenario, the lifestyle doesn't permits us to have healthy food habits this put us in more vulnerable situation to have various Liver ailments. This leads to search of novel drug particularly of natural origin.

Gastropathy is associated to the injury caused to gastric mucosa and damaging the epithelial cells. Gastritis is inflammation of gastric mucosa. Hence author's aim is to evaluate the hepatoprotective & anti diabetic activities. The liver is an important organ as it regulates many imperative metabolic functions. Hepatic damage is associated with alteration of these metabolic functions. Liver is the first organ in the body which expose to toxins absorbed from the GIT resulting in many liver diseases, this is key organ of metabolism and excretion. Thus liver diseases remain one of the serious health concerns.

A common metabolic disorder known as Diabetes mellitus with micro-and macrovascular complications those results in significant morbidity and mortality. It is considered as one of the cause among five leading causes of death in the world. Diabetes is in the top five of the most significant diseases in the developed world and is still gaining significance.

Since the existing drugs for the above said disorders encounter many side effects and need for prolonged treatment including questionable efficacy in the treatment, these reasons force the area of research to find improved treatments which will counteract the side effects and drawbacks of the existing treatment. Herbal drugs are having diversified uses are always an alternative option to the synthetic drugs

which are well known for their side and adverse effects. Hence under these conditions exploring new cures from plants source will always be beneficial because of less side effects. On the above facts the objective of this study to evaluate *Merremia emarginata* as a possible cure to above said disorders.

1) *Merremia emarginata*:

Merremia emarginata belong to the family *Convolvulaceae*, is a flowering creeping perennial her grows throuout India, China and Nepal. The *Merremia emarginata* is found in planes and at the altitude of about 900-1000 meters. In Ayurveda, the roots & leaves of *Merremia emarginata* are used to treat ailments like inflammation, flatulence, diuresis, paralysis, etc, whole plant of *Merremia emarginata* is reported to contain alkaloids glycosides, phenolic & flavonoids along with carbohydrates and aminoacids.

Much research has been undertaken to evaluate the drug to treat various ailments and to evaluate gastroprotective.

Plan of Work:

- Preparation of Methanolic extracts of *Merremia emarginata* by using soxhlet extraction.
- Phytochemical analysis of Methanolic extracts of *Merremia emarginata*.
- To study the acute toxicity of the Methanolic extracts of *Merremia emarginata* by OECD 423 guidelines.
- To evaluate the hepatoprotective activity of (ME1) and (ME2) in the CCl₄ induced hepatotoxicity in Wister rats.
 - a) Biochemical analysis of blood for marker enzymes-
 - SGOT
 - SGPT
 - Alkaline phosphate
 - Serum bilirubin and
 - Total bilirubin
 - b) To support the result of above-mentioned studies by histopathology study of liver.

MATERIALS AND METHODS

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The *Merremia emarginata* whole plant was collected from

Bidar forest area. A herbarium specimen is deposited in our college museum identification and authentication was done by Dr Malikarjun Patil of pharmacognosy department of Karnataka college of pharmacy Bidar.

The powder obtained was subjected to successive soxhlet extraction with the solvents with increasing polarity i.e. petroleum ether, chloroform, methanol and water.

Preparation of methanolic extracts of *M. emarginata*:

The authenticated whole plant of *Merremia emarginata* were dried in shade and powdered coarsely. Extraction was done according to standard procedure using analytical grade solvents. The coarse powder of the leaves was Soxhlet extracted with the solvents with increasing order of polarity i.e. petroleum ether (60-80°C), chloroform (59.5-61.5°C), methanol (64.5-65.5°C) ME1, and hydroalcoholic extract (methanol and water 50:50 ratio) ME2. After defating with petroleum ether, methanolic extract was also prepared. The extracts so obtained were concentrated under reduced pressure.

In addition the shade-dried powder was extracted directly with methanolic (hydro-alcoholic) extract which was used for pharmacological investigations after subjecting it to preliminary qualitative photochemical studies. The extracts were concentrated under reduced pressure and stored in desiccators until further use and the percentage yield of corresponding extracts were calculated.

Aims and Objectives:

Ailments like gastritis, peptic ulcer, and Liver disorders are appearing as a major threat in the future. These diseases are major concern in front of researcher because contributing factors are increasing in developing world.

The present scenario, the lifestyle doesn't permits us to have healthy food habits this put us in more vulnerable situation to have various gastric and hepatic ailments. This leads to search of novel drug particularly of natural origin.

Hence author's aim is to evaluate the hepatoprotective activity. The liver is an important organ as it regulates many imperative metabolic functions. Hepatic damage is associated with alteration of these metabolic functions. Liver is the first organ in the body which expose to toxins absorbed from the GIT resulting in many liver diseases, this is key organ of metabolism and excretion. Thus liver diseases remain one of the serious health concerns.

Allopathic medicines have failed to treat hepatic diseases completely without adverse effects, chiefly the plant based preparations are in use for their treatment of liver diseases with minimum adverse effects. Unfortunately very few drugs are available for the treatment of liver diseases. Since the existing drugs for the above said disorders encounter many side effects and need for prolonged treatment including questionable efficacy in the treatment, these reasons force the area of research to find improved treatments which will counteract the side effects and drawbacks of the existing treatment. Herbal drugs are having diversified uses are always an alternative option to the synthetic drugs which are well known for their side and adverse effects. Hence under these conditions exploring new cures from plants source will always be beneficial because of less side effects. On the above facts the objective of this study to evaluate *Merremia emarginata* as a possible cure to above said disorders.

1. Selection of Plant:

Appropriate selection of plants is very essential as any inappropriate selection can lead to wasting of time and resources. According to Elisabetsky and Moraes, there are three different methods of approach for the selection of medicinal plants.

- Randomized Method: Investigation takes an arbitrary course
- Chemotaxonomical/phylogenetical: Species are selected according to given chemical category of substances in a genus or family.
- Ethnopharmacological: Selection of plants is based on their therapeutic use by an ethnic group.

There is another aspect with which everyone agrees. If the selection of plant is made on the ground of their traditional use, the chances of research success are greater. After analyzing the above two aspects, the author has considered ethnopharmacology, availability and traditional uses and the author selected the following plant.

2. *Merremia emarginata*:

Merremia emarginata belong to the family *Convolvulaceae*, is a flowering creeping perennial herb grows throughout India, China and Nepal. The *Merremia emarginata* is found in plains and at the altitude of about 900-1000 meters. In Ayurveda, the roots & leaves of *Merremia emarginata* are used to treat ailments like inflammation, flatulence, diuresis, paralysis, etc, whole plant of *Merremia emarginata* is reported to contain alkaloids, glycosides, phenolic & flavonoids along with carbohydrates and aminoacids.

Much research has been undertaken to evaluate the drug to treat various ailments and to evaluate gastroprotective and hepatoprotective activity.

Collection of Plant Material and authentication:

The *Merremia emarginata* whole plant was collected from Bidar forest area. A herbarium specimen is deposited in our college museum identification and authentication was done by Dr Malikarjun Patil of pharmacognosy department of Karnataka college of pharmacy Bidar.

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Preparation of methanolic extracts of *Memarginata*:

The authenticated whole plant of *Merremia emarginata* were dried in shade and powdered coarsely. Extraction was done according to standard procedure using analytical grade solvents. The coarse powder of the leaves was Soxhlet extracted with the solvents with increasing order of polarity i.e. petroleum ether (60-80°C), chloroform (59.5-61.5°C), methanol (64.5-65.5°C) ME1, and hydroalcoholic extract (methanol and water 50:50 ratio) ME2. After defating with petroleum ether, methanolic extract was also prepared. The extracts so obtained were concentrated under reduced pressure.

In addition the shade-dried powder was extracted directly with methanolic (hydro-alcoholic) extract which was used for pharmacological investigations after subjecting it to preliminary qualitative photochemical studies. The extracts were concentrated under reduced pressure and stored in desiccators until further use and the percentage yield of corresponding extracts were calculated.

Evaluation of Hepatoprotective activity:

The hepatoprotective activity of hydroalcoholic extract of *Merremia emarginata* rhizome was evaluated by using CCl₄ induced acute hepatotoxicity model. In the hepatotoxic model, toxicant CCl₄ was administered with a dose of 0.5ml/kg i.p daily for seven days to the animals of group II, III, IV & V. The standard drug silymarin was administered with dose of 50 mg/kg p.o. Wistar rats of either sex were divided into 5 groups consisting of 6 animals in each group. Group I received 1% tween 80 for 7 days & served as normal control. Group II served as negative control received 1% tween 80 p.o for seven days. Group III and Group IV received ME1 and ME2 respectively a dose of 500 mg/kg, p.o for seven days. Group V received standard drug silymarin with a dose of 100mg/kg, p.o for seven days.

The Animals were sacrificed 24 hr after last treatment. The animals were anesthetized using ether and blood sample were collected by retro orbital plexus for biochemical estimation i.e. sALP, serum bilirubin, total bilirubin, sGOT, sGPT. After coagulation of blood at room temp serum was isolated by centrifugation at 2500 rpm for 20 minute. One liver from each group were separated. The livers after washing by normal saline were preserved in 10% formaldehyde for histopathological evaluation.

Estimation of Serum Enzymes:

a) Estimation of Glutamate Oxaloacetate Transaminase (SGOT):

The Span diagnostic reagent kit is used for the determination of serum enzyme SGOT using method of Reitman S and Frankel S (1957).

Principle:



The glutamate so formed here is coupled with 2,4-dinitro phenyl hydrazone (DNPH) to form the corresponding hydrazone which

gives a brown color in alkaline medium this can be measured calorimetrically at 505 nm.

The method for estimation of SGOT specified by Span Diagnostics is as follows.

Reagent preparation:

1. Reagent R1: Ready to use
2. Reagent R2: Ready to use

Stored at 2 – 8°C and protected from light.

Four parts of reagent R1 is mixed with one part of reagent R2. The mixture reagents can be used within 24 hours time after the preparation.

Experimental Procedure:

500 µl of reagent had mixed with 50 µl of sample and aspirated into the reaction vessel. The reading was taken after 60 sec intervals. The value of mean absorbance change per minute (A/min) was calculated using the standard equation:

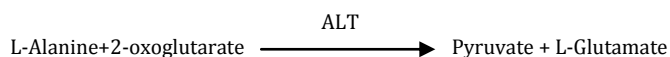
$$\text{ALT (IU/L)} = \text{A/min} \times 1745, \text{ table 19.}$$

b) Estimation of Glutamate Pyruvate Transaminases (SGPT):

Method of Reitman S and Frankel S (1957) and Span diagnostic reagent kit is used for the estimation of SGPT.

Principle:

Serum enzyme SGPT catalyses the following manner



The private formed here is coupled with 2, 4-dinitro phenyl hydrazone (DNPH) to give the respective hydrazone which forms brown color in alkaline medium which can be calculated calorimetrically at 505 nm.

The Span diagnostic reagent kit is used for the determination of serum enzyme SGPT the method specified by Span Diagnostics is as follows.

Reagent preparation:

1. Reagent R1: Ready to use
2. Reagent R2: Ready to use

Stored at 2 – 8°C and protected from light

Four parts of reagent R1 had mixed with one part of reagent R2. This mixture reagent was used within 24 hours time after the preparation.

Experimental Procedure:

500µl of reagent had mixed with 50µl of sample and aspirated into the reaction vessel. The reading was taken after one minute's intervals. The mean absorbance change per minute (A/min) was calculated using the following equation:

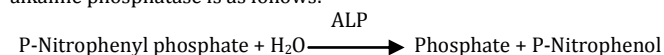
$$\text{ALT (IU/L)} = \text{A/min} \times 1745, \text{ table 1.}$$

c) Estimation of Alkaline Phosphatase:

The method of Marsh *et al.*, 1959 and Span diagnostic reagent kit is used for the estimation of Alkaline phosphatase.

Principle:

The enzyme reaction sequence employed in the assay of alkaline phosphatase is as follows:



The alkaline phosphatase hydrolyses disodium phenyl phosphate releasing phenol. The so released phenol react with 4-aminophenazone to form a condensation intermediate product, this intermediate product is then oxidized by potassium ferricyanide to form a colored product, which is measured calorimetrically at 624nm.

Method for the estimation of serum alkaline phosphatase is specified by Span Diagnostics is as follows:

Reagents:

1. Reagent R1: Buffer substrate –p20 x 1.2ml
2. Reagent R2: Buffer solution -25 ml

Reagent preparation: Here reconstituted one vial of the reagent with 1.2 ml of buffer solution as the working reagent.

Experimental Procedure:

500 µl of reagent had mixed with 10 µl of sample and aspirated into the reaction vessel. The reading was taken after one minute and additional three readings were taken at one minute intervals. The mean absorbance change per minute (A/min) was calculated using the following equation:
ALP (IU/L) = A/min x 2757, table 1.

d) Estimation of Serum Bilirubin:

Method of Perry *et al.*, 1983 and Span diagnostic reagent kit is used for the determination of serum bilirubin.

Principle:

The elevation of total serum bilirubin may occur due to the following reason.

1. Extreme hemolysis or damage or the red blood cells .eg. Hemolysis disease of the newborn.
2. Disease Liver eg. Hepatitis and cirrhosis.
3. Obstruction in the biliary tract. eg. Gallstones.

Elevated bilirubin levels are observed in patient with liver or biliary tract diseases. Bilirubin here reacts with diazotized sulfanic acid to produced azobilirubin, which has greatest absorbance at 546 nm in the aqueous solution. Here the intensity of the colour produced in the product is directly proportional to the amount of direct or total bilirubin concentration present in the serum sample.

Method for the estimation of serum bilirubin is specified by Span Diagnostics is as follows:

Reagent preparation:

1. Total bilirubin reagent R1 : Ready to use
2. Direct bilirubin reagent R2: Ready to use
3. Bilirubin activator : Ready to use 50

Experimental Procedure:

500µl of reagent had mixed with 50µl of sample and 50µl of bilirubin activator which was incubated for ten minutes and aspirated into the reaction vessel. The absorbance was taken at 540 -560 nm against a serum blank which consist of 500µl of reagent, 50µl of sample and 50µl of water , table 19

The Bilirubin content was calculated using the following equation:

$$\text{Total Bilirubin (mg/dt)} = \text{Abs of sample} - \text{Abs of sample blank} \times 15$$

$$\text{Direct bilirubin (mg/dt)} = \text{Abs of sample} - \text{Abs of sample blank} \times 10$$

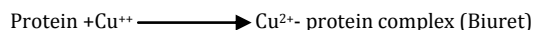
e) Estimation of Total Protein:

Method of Lowry *et al.*, 1951 and Span diagnostic reagent kit was used for the estimation of total protein.

Principle:

Serum proteins are responsible for maintaining the normal distribution of the water in circulation and also in the tissue by optimizing the osmotic pressure. The deficient fractions of serum protein vary in the blood and it this depends on the type of diseases. The low protein level is primarily caused by impaired synthesis, malnutrition, low (as by hemorrhage), or excessive protein catabolism, protein level are usually high in condition like dehydration.

The enzymatic reaction series employed in the assay of total protein are as follows;
Alkaline pH



Method for the estimation of serum total protein is specified by Span Diagnostics is as follows:

Reagent:

1. Total protein Reagent : Ready to use
2. Total protein Reagent : Ready to use

Total protein reagent was stored at room temperature (15-25°) and the standard at 2-8°C. Avoid contamination of Ready to use reagent.

Experimental procedure:

500µl of reagent had mixed with 10µl of sample which was incubated for five mins and aspirated into the reaction vessel. The absorbance was measured at 520-560nm within one hour against a reagent blank which consist of 500µl of reagent, 10µl of the standard, table 1.

The protein content was calculated using the following equation:

$$\text{Total protein} = \frac{\text{Abs of sample}}{\text{Abs of standard}} \times \text{concentration of standard protein (g/dl)}$$

Results of Hepato Protective Activity:**Study of serum enzymes:**

Toxicant CCL₄ on administration results in distinctive elevation in serum hepatic levels, sGPT, sGOT, sALP, Serum bilirubin & Total bilirubin when compared with the normal controls indicating liver damage (necrosis). Pretreatment of the animals with hydroalcoholic extracts (HAE1, HAE2) earlier to CCL₄ administration caused a marked reduction in the values of sGPT, sGOT, sALP, Serum bilirubin & Total bilirubin (p<0.01) almost comparable to the silymarin, (table 1).

Table No. 1: Effect of the *Merremia emarginata* extracts on serum enzyme in ccl₄ induced liver injury in rats

Groups	SGPT (IU/L)	SGOT (IU/L)	Serum ALP (IU/L)	Serum bilirubin (mg/dl)	Total bilirubin (mg/dl)
Group I Normal	51.5 ± 1.56	80.5 ± 2.14	97 ± 1.71	0.49 ± 0.0071	1.49 ± 0.0220
Group II, CCL ₄ treated	268.5 ± 9.74	290.33 ± 3.04	318.33 ± 1.76	1.05 ± 0.0331	4.29 ± 0.1592
Group III, CCL ₄ & HAE1 treated	84.5 ± 2.59**	118.33 ± 3.11**	135.67 ± 1.61**	0.61 ± 0.0096**	1.91 ± 0.02801**
Group IV, CCL ₄ & HAE2 treated	96.2 ± 1.47**	132.16 ± 2.32**	145.83 ± 1.01**	0.68 ± 0.0133**	2.71 ± 0.1833**
Group V, CCL ₄ & Silymarin treated	72.8 ± 1.25**	104.5 ± 3.03**	119.33 ± 0.99**	0.56 ± 0.0162**	1.65 ± 0.0183**

Data are presented as mean ± SEM, (n=6), **p<0.01, when compared with CCL₄ control group. Using repeated measure ANOVA followed by Dunnett's t test.

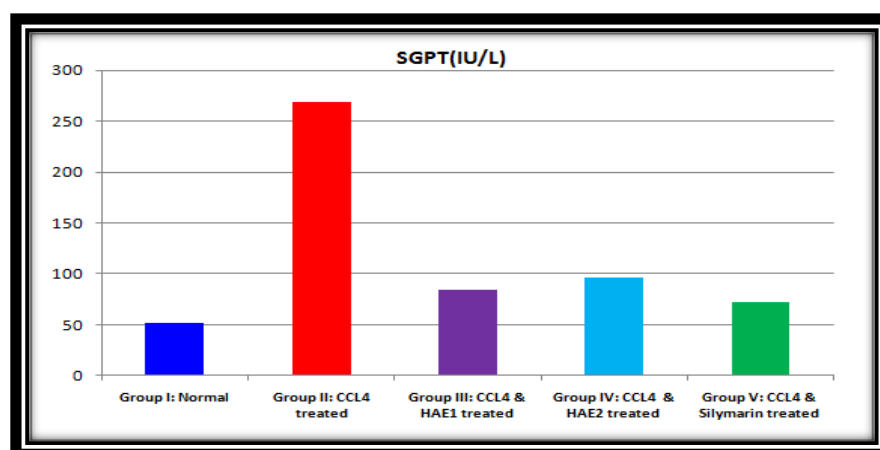


Fig. 1: Effect of the *Merremia emarginata* on SGPT (IU/L) in CCL₄ induced liver injury in rats

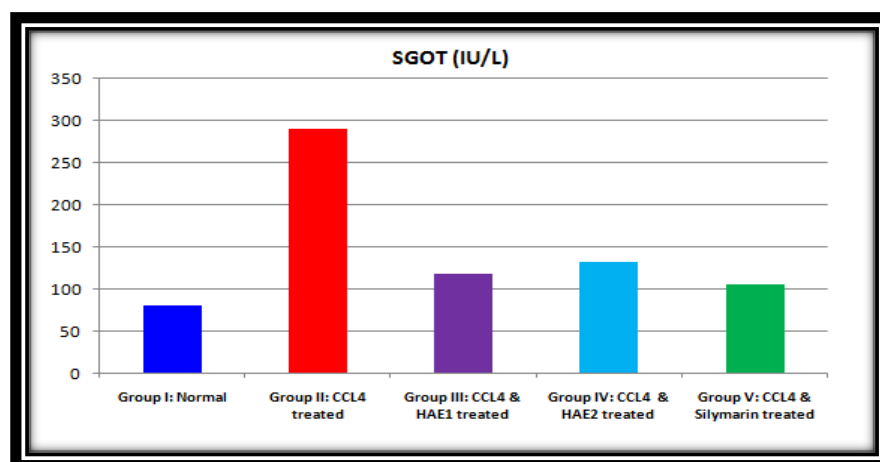


Fig. 2: Effect of the *Merremia emarginata* on SGOT (IU/L) in CCL₄ induced liver injury in rats

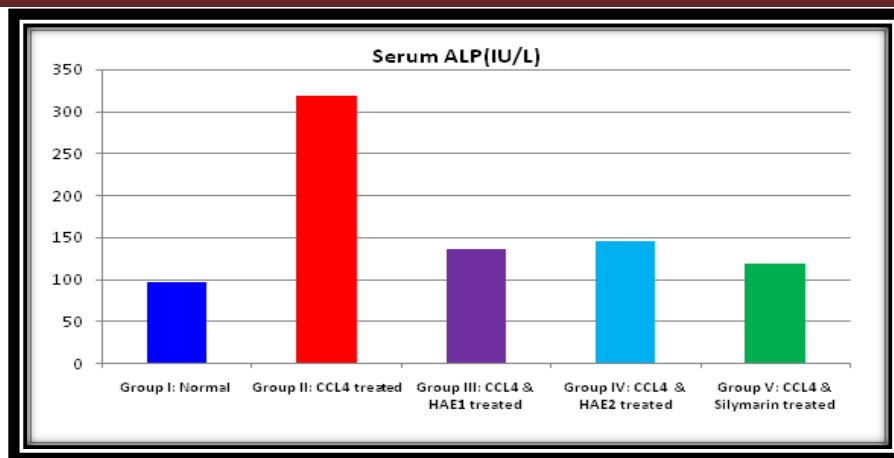


Fig. 3: Effect of the *Merremia emarginata* on Serum ALP (IU/L) in CCL₄ induced liver injury in rats

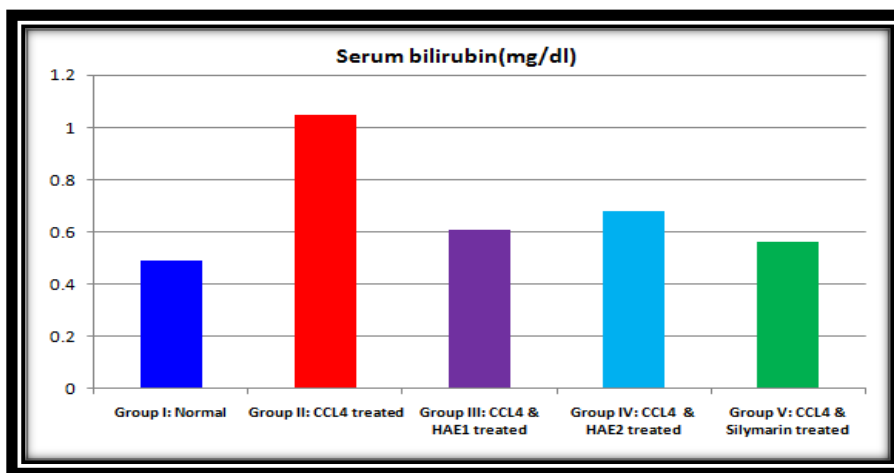


Fig. 4: Effect of the *Merremia emarginata* on Serum bilirubin (mg/dl) in CCL₄ induced liver injury in rats

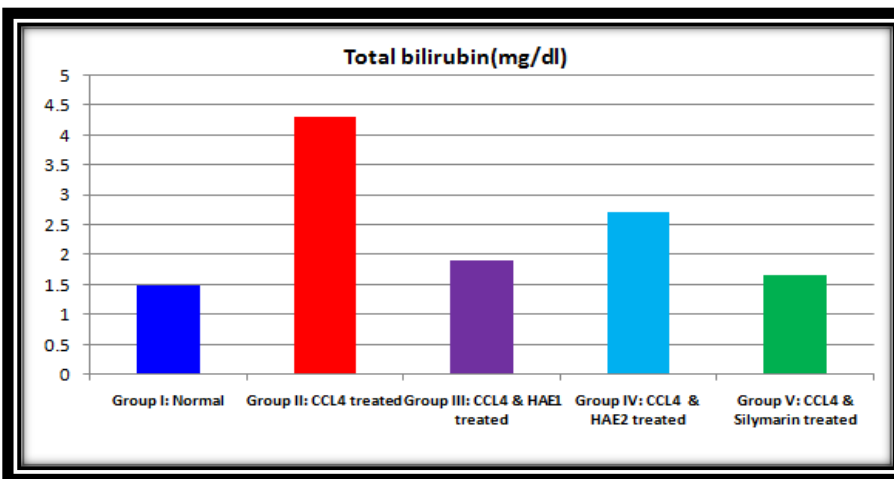


Fig. 5: Effect of the *Merremia emarginata* on Total bilirubin (mg/dl) in CCL₄ induced liver injury in rats

Result of Histopathological Studies:

The results of histopathological studies reveal that the histological architecture of liver sections of control (group I) has normal hepatic cells with prominent nucleus, well preserved cytoplasm, nucleolus and clearly noticeable central veins. The hepatoprotective effect of methanolic extracts of *Merremia emarginata* was established by histopathological results of the liver tissue of control (group I) and treated (group III,IV) animals. The (group II) CCL₄ treated liver section showed severe central vein congestion, massive fatty changes,

centrilobular necrosis, entrilobular degeneration, ballooning of hepatocytes, inflammation and loss of cellular boundaries. The histological architecture of liver section of the animals treated with *Merremia emarginata* extracts showed more or less normal lobular pattern with a mild degree of fatty change, centrilobular necrosis, central vein congestion and mild inflammation almost similar to the silymarin treated and control groups. Silymarin treated group had maintained the normal histology with negligible damage (Fig 6).

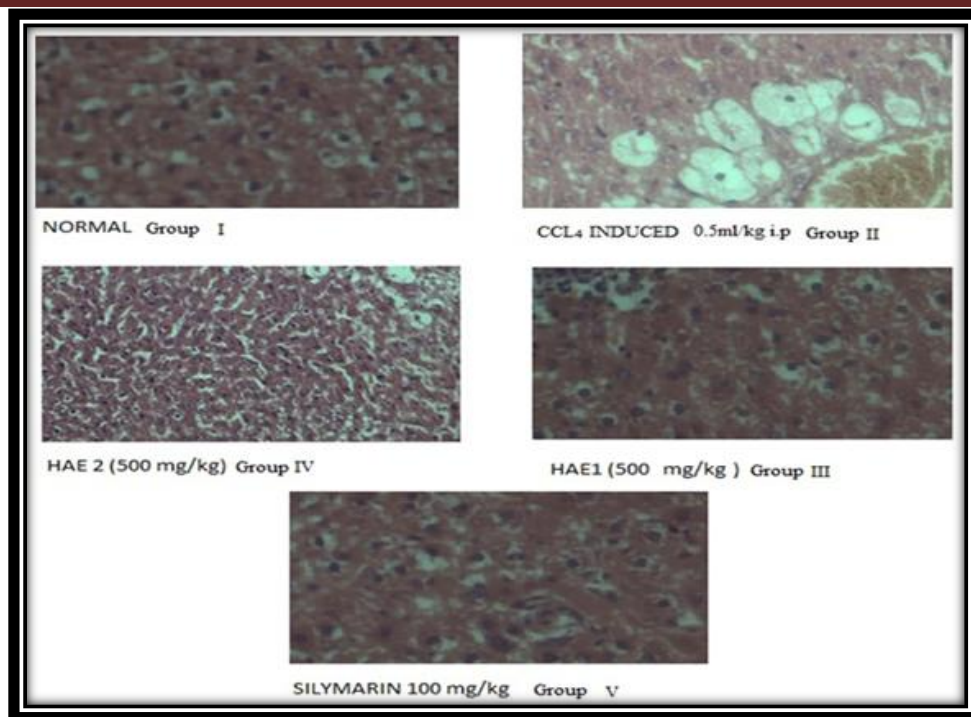


Fig. 6: Results of histopathological studies of liver of rats of five groups

DISCUSSION

In gastro protective study *Gastropathy* is the term used when there is injury to the gastric mucosa associated with epithelial cell damage and regeneration. Peptic ulcer is the most common gastrointestinal disorder in clinical practice. A number of factors such as stress, chemical agents' bile salts hyperosmolar NaCl, NSAIDs, may lead the gastro duodenal ulcer. Ulcers are caused due to imbalance between aggressive and defensive factors of gastric mucosa. The gastric wall mucus is thought to play an important role as defensive factor against gastrointestinal damage. Failure of the endogenous defense mechanism of the protective mucosal barrier leads to burning sensation in the abdomen. Duodenal ulcer more frequently (80% of PUDs) than gastric ulcers. The lifetime prevalence PUDs is about 10% PUDs are recurrent and most clinical studies are shown that approximately 50% of all ulcers.

A recent review reported that the anti-ulcerogenic potential of many plant remedies. Worldwide have been investigated experimentally so far and diverse molecules have been determined as the active ingredients. Ulceration occurs when there is a disturbance of the normal equilibrium caused by either enhanced aggression or diminished mucosal resistance. At the same time, each of these drugs confers simpler to hematopoietic changes. Validation of the efficacy and harnessing of medicinal plants for the treatment of PUDs is a very promising approach to overcome the limitation of orthodox medicines. Already there is a blizzard of scientific evidences in support of efficacy of medicinal plants in the management of ulcers of different etiologies.

A peptic ulcer is a serious gastrointestinal disorder that requires a well-targeted therapeutic strategy. A number of drugs are available in the world for the treatment of peptic ulcer. Such as H₂ antihistamines, proton pump inhibitors, anticholinergic, prostaglandins analogues, ulcer protective and ulcer healing drugs, but their clinical evaluation has shown incidence of various adverse drug reaction. This is the rationale for the development of the new anti-ulcer drug. The gastro-intestinal ailments are common worldwide due to junk food and stressful life style.

In one of our field survey a widely grown, creeping, smooth and hairy herb by name *Merremia emarginata* belongs to convolvulaceae family found throughout in India, in plains and hills. The phytochemical constituents of *Merremia emarginata* whole plant proven to show anti-ulcer property because of the presence

of Tannins suggest its probability of being a gastroprotective herbal alternate.

The present scenario of food habits, sedentary life style demands the search for novel gastro protective/Hepatoprotective/anti-ulcer drugs. Hence the blatant idea of selecting the plant *Merremia emarginata* was conceptually adopted keeping review and hypothesis of anti-ulcer property and organ protection in view, the whole plant of *Merremia emarginata* is selected for assessing the Hepatoprotective, gastro-protective, and Anti-ulcer potential.

Merremia emarginata whole plant were selected based on the basis of claims of native practitioner and available phytochemical profile of the plant. Since leaves of the plant possess flavanoids, these are known to possess anti-oxidant property, it was thought to screen the whole plant for organprotective property by using various models of experimentally induced gastropathy and for antioxidant property. In the present study various extracts of whole plant *Merremia emarginata* were prepared by using successive soxhlet procedure. They are subjected to preliminary phytochemical tests. It is observed that steroids, Carbohydrates, glycosides, tannins and phenolic compounds are present in petroleum ether, chloroform and methanolic extract. Flavonoids are present only in chloroform and ethanol extract.

These results are indicative of gastroprotective activity of the plant under study.

CONCLUSION

The *Merremia emarginata* whole plant contains alkaloids, steroids, glycosides, flavonoids, tannins, carbohydrates and proteins. Methanolic extract of *Merremia emarginata* whole plant increased the PH of Gastric juice.

Methanolic extract of *Merremia emarginata* whole plant reduce total acidity and free acidity.

Treatment with Methanolic extract of *Merremia emarginata* whole plant has significantly reduced the volume of gastric juice.

Methanolic extract *Merremia emarginata* whole plant shows significant Hepatoprotective activity which is evident by Serum Enzymes.

Scope for Further Study:

Since, our study has indicated only the usefulness of *Meeremia emarginata* whole plant in treating hepatic disorders, there is room for further study to identify, isolate, characterize and evaluate the active principle responsible for the hepatoprotective activity of the plant. In addition toxicological aspects of the plant is not studied in this project work. Hence, a study may be undertaken from the toxicological point of view. Even formulation and evaluation of this herb may also be studied.

SUMMARY

Merremia emarginata whole plant was subjected to preliminary phytochemical investigation and was found that it possess alkaloids, steroids, glycosides, flavonoids, tannins, carbohydrates and proteins. The Methanolic extract of *Merremia emarginata* whole plant has shown hepatoprotective activity in various screening models. It has demonstrated the Hepatoprotective, Gastro protective /anti-ulcer activity which was evident by Serum Enzyme level.

Our study has justified the claim of native herbal practitioners that the plant extract is useful in treating the hepatic disorders..

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