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A Pharmacological Study and Evaluation of Antiulcer 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 antiulcer activity. The Methanolic extract of Merremia emarginata whole plant has shown anti-ulcer potential in various screening models of anti-ulcer activity. It has demonstrated the gastro protective /anti-ulcer activity which was evident by decrease in the ulcer index.Our study has justified the claim of native herbal practitioners that the plant extract is useful in treating the gastric disorders.

KEY WORDS: Merremia emarginata; anti-ulcer activity; gastro protective; gastric disorder; ulcer index;

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1. INTRODUCTION

Ailments like gastritis, peptic ulcer, 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 gastric ailments. This leads to search of novel drug particularly of natural origin.

Gastropthy 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 gastro protective activity along with hepatoprotective and 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 macro vascular 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 emerginata* as a possible cure to above said disorders.

1) *Merremia emerginata*

Merremia emerginata belong to the family *Convolvulaceae,* is a flowering creeping perennial her grows throuout India, China and Nepal. The *Merremia emerginata* is found in planes and at the altitude of about 900-1000 meters. In Ayurveda, the roots & leaves of Merremia emerginata are used to treat ailments like inflmation, flatulance, diuresis, paralysis, etc, whole plant of *Merremia*

emerginata 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 emerginata* by using soxhlet extraction.
- Phytochemical analysis of Methanolic extracts of *Merremia emerginata* .
- To study the acute toxicity of the Methanolic extracts of *Merremia emerginata* by OECD 423 guidelines.
- To evaluate anti-ulcer activity of the extract by using experimentally induced ulcer using following models.

✓ Pylorus ligation ulcer.

✓ Drug induced ulcer

MATERIALS AND METHODS

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 soxhelt 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^{o}C), chloroform (59.5-61.5^{o}C), methanol (64.5-65.5^{o}C) ME1, and hydroalcoholic extract (methanol and water 50:50 ratio) ME2. After defating with petrolium 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 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 ailments. This leads to search of novel drug particularly of natural origin.

Gastropthy 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 gastroprotective activity.

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 emerginata* as a possible cure to above said disorders.

4.1. 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.

a) Randomized Method: Investigation takes an arbitrary course
b) Chemotaxanomical/phylogenetical: Species are selected according to given chemical category of substances in a genus or family.
c) Ethno pharmacological: 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 ethno pharmacology, availability and traditional uses and the author selected the following plant.

2) *Merremia emerginata*

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

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MATERIAL AND METHODS

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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.

4.5Evaluation of Anti-ulcer activity

4.5.1 Pylorus ligation ulcer models.

Albino wistar rats of either sex weighing between 150-200gm were divided into four groups of 6 animals each.

Group: I: – Control

Group II;- Standard(Lansoprozole 8mg/kg)

Group III :- Test drug ME 100 mg/kg

Group IV: - Test drug ME 200 mg/kg

In this method albino rats were fasted in individual cages for 24hrs. Care was being taken to avoid caprophagy. Methanolic extract (ME1) and standard drugs were administerd 30 minutes prior to pylorous ligation as mention above. Rats were sacrificed by an over dose of anaesthetic ether after 4 hrs of pyloric ligation, the abdomen was opened, cardiac end of stomach was dissected out and the contents were drained in centrifuge tube. The volume of gastric was measure and centrifuged at 2000rpm for 10 min. from the supernatant aliquots were taken for determination of PH, total, and free acidity.

i. Determination of total acidity

An aliquot of 1ml gastric juice diluted with 1 ml of distilled water was taken into a 50 ml conical flask and two drops of phenolphthalein indicator was added to it and titrated with 0.01N Sodium hydroxide until a permanent pink colour was observed. The volume of 0.01N NaOH consumed was noted.

The total acidity is expressed as mEq/L by the following formula:

$$\text{Acidity} = \frac{\text{Vol.of NaOH x N x 100}}{} \text{ mEq/L}$$

ii. Determination of free acidity

Instead of phenolphthalein indicator, the Topfer's reagent was used. Aliquot of gastric juice was titrated with 0.01N Sodium hydroxide consumed was noted. The free acidity was calculated by the same formula for the determination of total acidity.

4.5.2 Aspirin induced ulcer Model

Albino wistar rats of either sex weighing between 150-200gm were divided into four groups of 6 animal each

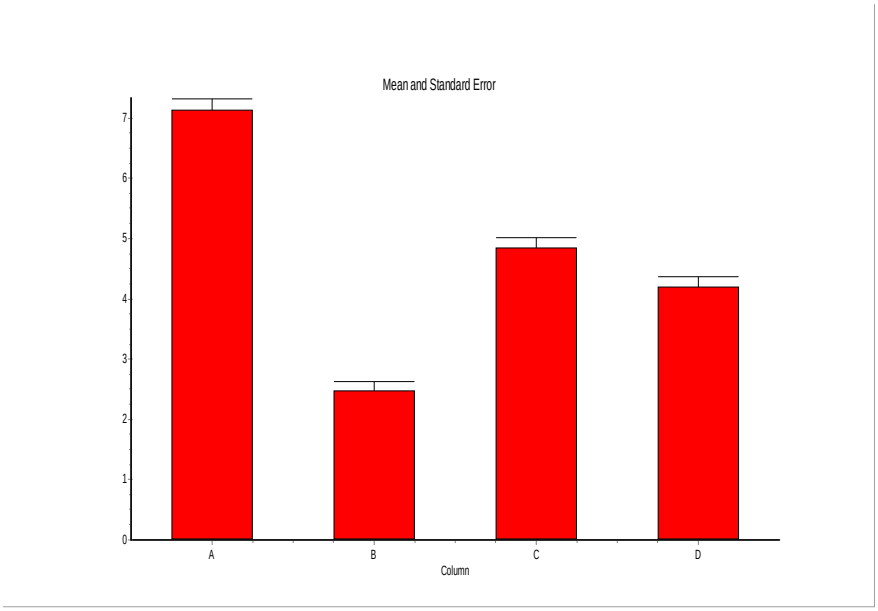
Group: I – Control

Group II:- Standard(Lansoprozole 8mg/kg)

Group III: - methanolic extract of ME1 (100 mg/kg)

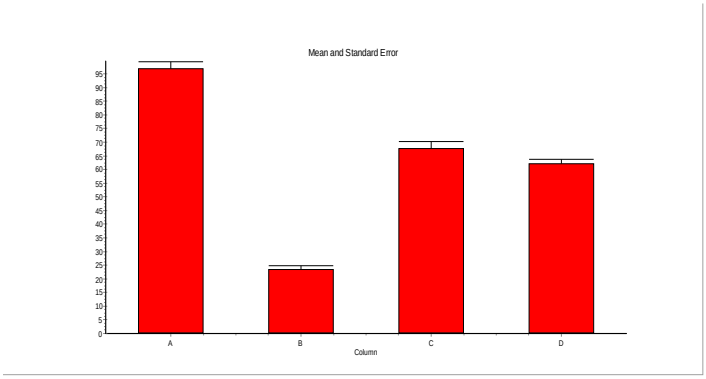
Group IV: - methanolic extrct of ME (200 mg/kg) The animal are fasted for 24 hrs. the test drugs are administered orally 30 min prior to asprin at the dose of 200mg/kg. after four hours the rats are sacrificed by using anaesthetic ether and examined the gastric ulcer.

The test drugs are administered orally in 2% gum acacia suspension 3o min prior to aspirin at dose of 200 mg/kg.The results are compiled and graphically shown in Fig.6



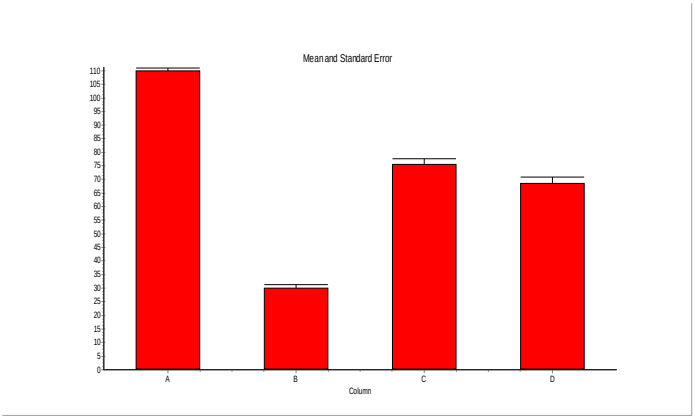
A= CONTROL B= STANDARD C= ME 100 mg/kg D = ME 200 mg/kg

Fig .1 Effect methanolic extract of whole plant of Merremia emarginata. on mean value of gastric juice followed by pylorus ligation



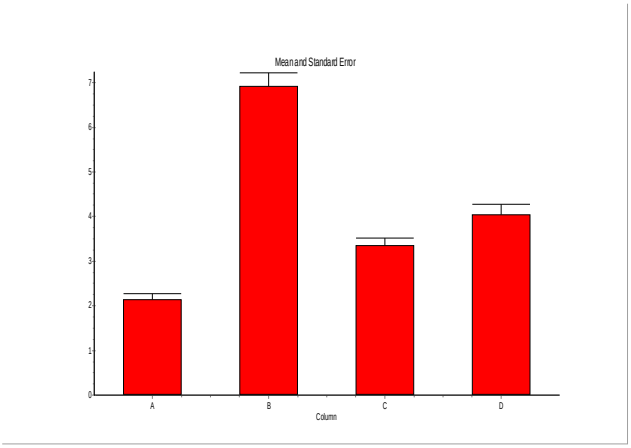
A= CONTROL B= STANDARD C= ME 100 mg/kg D= ME 200 mg/kg

Fig. 2. Effect of methanolic extract of whole plant of Merremia emarginata. on mean value of free acidity followed by pylorus ligation method.



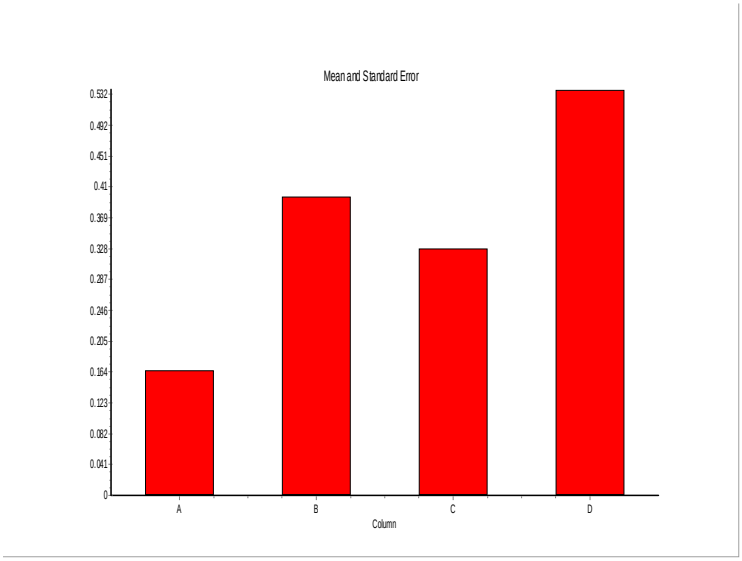
A= CONTROL B= STANDARD C= ME 100 mg/kg D = ME 200 mg/kg

Fig. 3. Effect of methanolic extract of whole plant of Merremia emarginata. on mean value of total acidity followed by pylorus ligation method



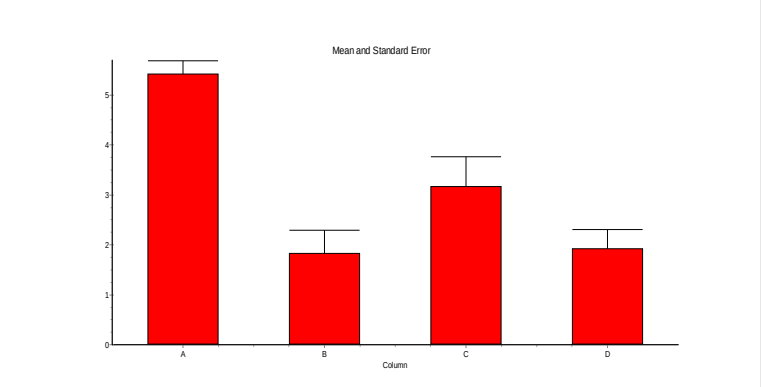
A= CONTROL B= STANDARD C= ME 100mg/kg D= ME 100 mg/kg

Fig. 4. Effect of methanolic extract of whole plant of Merremia emarginata. on mean value of gastric PH followed by pylorus ligation method



A= CONTROL B= STANDARD C= ME 100 mg/kg D = ME 200 mg/kg

Fig. 5. Effect of methanolic extract of whole plant of Merremia emarginata on ulcer index followed by pylorus ligation method



A= CONTROL B= STANDARD C= ME 100 mg/kg D = ME 200 mg/kg

Fig. 6. Effect of methanolic extract of whole plant of Merremia emarginata on ulcer index followed by aspirin method

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 emerginata* belongs to convolvulaceae family found throughout in India, in plains and hills. The phytochemical constituents of *Merremia emerginata* 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/anti-ulcer drugs. Hence the blatant idea of selecting the plant *Merremia emerginata* 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 gastro-protective, viz Anti-ulcer potential.

Merremia emarginata whole plant were selected based on the basis of claims of native pratictioner and available phytochemical profile of the plant. Since leaves of the plant posses flavanoids, these are known to posses 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 pet. 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.

5. CONCLUSIONS

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 anti-ulcer activity which is evident by decrease in ulcer index.

6. 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.

7. 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 anti-ulcer potential in various screening models of anti-ulcer activity. It has demonstrated the gastro protective /anti-ulcer activity which was evident by decrease in the ulcer index.

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

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