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EVALUATION OF ANTI-ULCER ACTIVITY OF *CINNAMOMUM TAMALA* LEAVES EXTRACT ON EXPERIMENTAL ANIMALS

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ABSTRACT

The present study was designed to study the antiulcer potential of 50% ethanolic extract of *Cinnamomum tamala* (EECT) on experimentally induced ulcer models like pylorus ligation, ethanol, and aspirin.In all three models, the effect of ethanol extract of *Cinnamomum tamala* was observed by calculating ulcer index based on lesion index and pH. The results of te present investigation reveal that in all three models studied, EECT (50,100 and 200 mg/kg,p.o) produced a dose-dependent significant protection against ulcer models in animals**.** But among the dose levels EECT at 200 mg/kg dose significantly ($p<0.05$) changed the gastric volume, ulcer index, and pH. In conclusion, the results indicated that ethanolic extract of *Cinnamomum tamala* shows significant antiulcer activity by inhibiting the gastric lesions and provides the significant gastroprotective effect which may be associated with its antioxidant property.

KeyWords: *Cinnamomum tamala*, antiulcer, pylorus ligation, Gastro protective, Antioxidants

INTRODUCTION

The ulcer is a lesion of the gastric mucous membrane and is considered as a modern age epidemics, produced due to an imbalance between acid and pepsin which causes injure to the mucosal layer of the stomach, via excess production of exogenous and endogenous oxygen free radicals. Some of the main causes of gastric ulcers include the continual use of alcoholic beverages and anti-inflammatory drugs, long time stress and Helicobacter pylori infection [1]. Although many available synthetic drugs are used to treat gastric ulcers, most of them produce several adverse reactions, when used at long term[2]. Plant extracts, containing a wide variety of antioxidants such us phenolic and flavonoid compounds, are some of the most attractive sources of new drugs and have been shown to produce promising results for the management of gastric ulcers [3].

Cinnamomum tamala is commonly known as tejpat from the Lauraceae family which is native to India, Bangladesh, Nepal, Bhutan, and China. It is also found in tropical and sub tropical Asia, Australia, pacific region and south Asia. It can grow up to 20 m (66 ft) tall. It has aromatic leaves which are used for culinary and medicinal purposes. leaves of this tree are the spice having clove like the taste and a faint pepper-like odour and mainly used for flavoring the food.The main constituents of leaves are α-pinene, camphene, myrcene, limonene, germacrene A, α-gurjunene, 1-8-cineole, *p*-cymene, methyl eugenol, eugenol acetate and methyl ether of eugenol have been reported in *C. tamala* [4].

The essential oil of the leaves called tejpat oil is medicinally used as carminative, antiflatulent, diuretic and is used in cardiac disorders. The use of this plant in the traditional literature is well documented as a remedy for various ailments such as anorexia, bladder disorders, and dryness of mouth, coryza, diarrhea, nausea and as hypoglycemic, stimulant and carminative properties [5]. However, limited scientific investigations have been done to verify these claims.In light of the above information on the gastrointestinal disorder plants, we aimed to study the antiulcer activity of *Cinnamomum tamala* leaves extract against ulcer animal models.

MATERIALS & METHODS

Animals

Male Sprague-Dawley rats (150-175 g) and were obtained from National Laboratory Animal Centre (NLAC), Lucknow and housed in polypropylene cages for 2 weeks. Animals were provided with standard rodent pellet diet (Amrut, India) and were maintained in a temperature and humidity controlled environment on a 12-hr dark/light cycle. The food was withdrawn 24h before the experiment but the water was allowed *ad libitum*.All studies were performed in accordance with CPCSEA guidelines and approved by the Institutional Animal Care Committee, CPCSEA, India (Reg. No. 222/2000/CPCSEA).

Plant material and preparation of ethanolic extracts

The dried plant leaves of *Cinnamomum tamala* were collected from the local market and it was identified, authenticated by Dr. Kaushal Kumar, taxonomist and the voucher specimen number NBR-370 is deposited in the departmental museum. The leaves were then powdered and passed through a 10-mesh sieve. The coarsely powdered material was exhaustively

extracted thrice with 50% aqueous ethanol. The extracts were filtered, pooled and concentrated at reduced temperature (5^{o}C) on a rotary evaporator (Buchi, USA) and then freeze-dried (Freezone® 4.5, Labconco, USA) at high vacuum (133X10^{-3} m Bar) and at temperature –40 ± 2 ^{0}C (yield 15.2%, w/w). The extract so obtained was dissolved in 10% methanol in water and extracted. Successively with n-hexane, chloroform, ethyl acetate, butanol, and water. The lyophilized extract yields are 7.8, 5.5, 7.2, 8.1 and 9.4% w/w, respectively. Keeping in view the percentage yield and activity, the 50% ethanolic extract was taken up for antiulcer activity.

Determination of total tannins

Contents of total tannins were determined to the method of Folin-Ciocalteu reaction using tannic acid as standard and the total tannins content was expressed as tannic acid equivalents in milligrams per gram sample.

Anti-ulcer study

The extract was administered to various groups, orally, twice daily for five days and experiment was carried out on 18-24 h fasted rats on the 6th day. The ulcer was scored and analyzed as described earlier.

Study design

In all three models, the animals were divided into five groups of six animals each. Group I served as PL control, which received vehicle only. Group II served as *C.tamala* (50 mg/kg, p.o.), Group III received *C.tamala* (50 mg/kg, p.o.), Groups IV received *C.tamala* (50 mg/kg, p.o.), and group V received Ranitidine (50 mg/kg, p.o.) as standard drug .

Pylorus ligated (PL) ulcers

Animals in all groups fasted for 18 h after the assigned treatment, anesthetized and the pyloric was ligated. The rats were sacrificed after 4 h by excess anesthesia pentobarbitone sodium (35 mg/kg. The stomach was removed, opened along the greater curvature and the gastric lesions were observed. The gastric ulcers were counted and the ulcer index was determined [6].

Aspirin (ASP)-induced ulcers

Aspirin was administered orally on the day of the experiment at about 10 AM with the help of an orogastric tube in the form of an aqueous water suspension (200 mg/kg, p.o.) and animals were sacrificed after 4 h of administration. The stomach was incised along with the greater curvature and ulcers were counted and the ulcer index was determined [7].

Ethanol (EtOH)-induced ulcer

The gastric ulcer was induced in rats by administering ethanol (EtOH, 100%, 1ml/200 g, 1 h). EtOH was administered on the day of the experiment and the animals were sacrificed by cervical dislocation and stomach was incised along with greater curvature and examined for ulcers. The ulcer index was scored, based upon the product of length and width of the ulcer present in the glandular portion of the stomach (mm^2/rat) [8].

Statistical analysis

The data represent Mean ± S.E.M. Results were analyzed statistically using one-way ANOVA followed by Tukey's multiple comparisons. The minimum level of significance was set at $p < 0.05$

RESULTS

Table.1 Effect *Cinnamomum tamala* extract on Pylorus ligation-induced gastric ulcers

Group	Treatment	Dose (mg/kg.p.o)	Ulcer index (mm^2/rat)	Percentage protection
I	Control (Pylorus ligated)	-	19.6±2.2	-
II	*C.tamala*	50	12.8±1.81*	34.74%
III	*C.tamala*	100	8.1±2.08*	58.49%
IV	*C.tamala*	200	4.8±0.94*	75.43%
V	Ranitidine	50	3.5±0.84*	82.19%

Values are mean ± SEM for 6 rats. The level of significance was set at $p< 0.05$
When compared to control groups.

Table.2 Effect *Cinnamomum tamala* extract on Ethanol-induced gastric ulcers.

Group	Treatment	Dose (mg/kg.p.o)	Ulcer index (mm^2/rat)	Percentage protection
I	Ethanol	-	17.5±2.60	-
II	*C.tamala*	50	13.3±1.74*	23.82%
III	*C.tamala*	100	8.5±1.99*	51.42%
IV	*C.tamala*	200	6.1±1.49*	64.80%
V	Ranitidine	50	4.5±0.84c*	74.28%

Values are mean ± SEM for 6 rats. The level of significance was set at $p< 0.05$
When compared to control groups.

Table.3 Effect *Cinnamomum tamala* extract on Aspirin-induced gastric ulcers.

Group	Treatment	Dose (mg/kg.p.o)	Ulcer index (mm^2/rat)	Percentage protection
I	Aspirin	-	21.0±1.98	-
II	*C. tamala*	50	15.33±1.37*	28.69%
III	*C. tamala*	100	7.33±0.98*	65.90%
IV	*C. tamala*	200	3.83±0.94*	82.18%
V	Ranitidine	50	2.16±0.30*	89.95%

Values are mean ± SEM for 6 rats. The level of significance was set at $p< 0.05$
When compared to control groups.

DISCUSSION

The etiology behind the peptic ulcer is unknown in most of the cases, yet it is generally accepted that it results from an imbalance between aggressive factors and the mucosal integrity through the endogenous defence mechanisms.To regain the balance, different therapeutic agents are used but the major drawback is that they cause the unpredictable side effects while going for chronic usage. Hence, the search on to find a drug possessing antioxidant and antiulcer properties is still underway. In the traditional system of medicine in which plant derivatives are the main ingredients which have gained worldwide recognition and popularity. Keeping in view, extracts of *Cinnamomum tamala* was studied for anti-ulcer activity.

Results of the present study showed that the ethanolic extract of *Cinnamomum tamala* possess antiulcer activity as evidenced by its significant inhibition in the formation of ulcers in all the models studied and this inhibition was dose dependent.In the pylorus ligation model,rats, treated with 50% ethanol showed the ulcer index of 19.6±2.2. But animals treated with an ethanolic extract of *C.tamalia* significantly decreased the ulcer index, there was a significant dose-dependent increase in the percentage of protection were also observed. Particularly *C.tamala* 200 (mg/kg.p.o) showed the maximum percentage of protection (75.43%). In addition the reduction of the ulcer lesion, there was a significant ($p < 0.05$) decrease of ulcer index in dose dependant manner when compared control groups.

In the case of ethanol model, the ethanol-induced gastric ulcer was employed to study the cytoprotective effect of the extracts. Ethanol-induced gastric lesion formation may be due to stasis in gastric blood flow which contributes to the development of the hemorrhage and necrotic aspects of tissue injury. In the present study, extract of *C.tamala* 200 (mg/kg.p.o) showed the maximum percentage of protection (75.43%) which may be due to both reductions in gastric acid secretion and gastric cytoprotection.

Incase of aspirin model, Aspirin causes mucosal damage by interfering with Vprostaglandin synthesis, increasing acid secretion and back diffusion of H+ ions thus, aspirin further aggravated the acidity and the resistance of the gastric mucosa was decreased thereby causing extensive damage to the glandular regions of the stomach[9].But this was reversed to a significant extent by an extract of *C.tamala.* From the results, it is clear that the extract of *C.tamala* exhibited significant antisecretory activity by reducing the secretory parameters when compared with the control group. In conclusion, ethanolic extract of *C.tamala exhibited* significant antiulcer activity, which may be attributed to the presence of its phytoconstituents. Further investigations are needed to elucidate the exact mechanisms of *Cinnamomum tamala* for it's the antiulcer activity.

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