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ANTIULCER ACTIVITY OF *CAYRATIA PEDATA*, *ENICOSTEMMA AXILLARE* AND *TERMINALIA CHEBULA* ON ETHANOL INDUCED ALBINO WISTAR RATS

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ABSTRACT:

Ulcers are an open sore of the skin or mucus fluid layer portrayed by sloughing of aggravated dead tissue. There are numerous sorts of ulcer, for example, mouth ulcer, throat ulcer, peptic ulcer, and genital ulcer. Of these peptic ulcer is seen among numerous individuals. Gastric ulcers are situated in the stomach, portrayed by agony; ulcers are basic in more seasoned age bunch. Eating may expand torment as opposed to assuage torment. Different manifestations may incorporate sickness, spewing, and weight reduction. Despite the fact that patients with gastric ulcers have typical or reduced corrosive creation, yet ulcers may happen even in complete absence of corrosive (Vyawahare *et al.*, 2009). Duodenal ulcers are found toward the start of small intestine tract and are portrayed by serious torment with copying sensation in upper belly that stirs patients from rest. By and large, torment happens when the stomach is vacant and diminishes in the wake of eating. Duodenal ulcer is more basic in more youthful people and prevalently influences guys. In the duodenum, ulcers may show up

on both the foremost and back dividers (Brooks, 1985). Now, peptic ulcer can be life debilitating with side effects like bleeding stool, serious stomach torment and issues alongside vomiting blood.

KEY WORDS: Cayratia pedata, Enicostemma axillare and Terminalia chebula , genital ulcer.

INTRODUCTION:

The Peptic ulcer is a perpetual, non-harmful incendiary infection portrayed by ulceration in the upper gastro-intestinal tract (stomach and duodenum) where parietal cells area found, which are usually acidic and thus, extremely painful. Several factors - such as improper digestion, metabolism, elimination of food, mental and physical stress enhance the growth of peptic ulcers. A number of drugs are available for the treatment of peptic ulcers, but the medical evaluation of these drugs indicates high incidences of side effects and drug interactions. The pathophysiology of peptic ulcer disease involves an imbalance between offensive and defensive factors. Approximate 15,000 deaths occur with peptic ulcer disease. The pathophysiology of peptic ulcer disease involves an imbalance between offensive (acid, pepsin, and Helicobacter pylori) and defensive factors (mucin, prostaglandin, bicarbonate, nitric oxide, and growth factors) (Hoogerwerfand, 2001.) Today, most of the world population depends upon plant based drugs for their primary health care needs. (Ahmed, et al., 2008) World Health Organization (WHO) estimates that 80% of the people living in developing countries almost exclusively use traditional medicines plant.

A new drug provides from plants sources, which have historical background. Although modern medicines may be available, due to socio-economical, cultural and historical reasons, these drugs have maintained their importance. (Sartori, et al., 1999). A number of drugs are used widely for the treatment of ulcer (Soll, 1990). The drugs show their affect mostly by inhibiting the Cox enzyme, protective mechanism, neutralizing mechanism and so on. Inspite of its curative affects they show some side effects (Chan, 2000). Indian Medicinal plants and their derivatives have been an invaluable source of therapeutic agents to treat various disorders including peptic ulcer.

Cayratia pedata Lam. is a climber belonging to the Family Vitaceae and it grows in shrubberies of India, Andaman Islands, Ceylon and Malasiya. Traditionally whole plant is used in the treatment of Anti-diarrhoeal and refrigerant, useful in burn and hysteria (Joy, et al., 1998). In folklore claim, it is used for treating ulcer, diarrhoea, burns, refrigerants, uterine, flukes, a stringents low diuretic activity and has been a reputed remedy for cough, bronchitis, asthma, joint pain and to check uterine reflexes. The decoction of the leaves was used to check uterine and other fluxes (Patil, 2000). The plant has also found to possesses anti-inflammatory and antinociceptive activities (Veeradass Rajendran, 2011).

Enicostmma axillare (Lam.) Raynal. Syn.*E. littorale Blume* (Family - Gentianaceae), locally called as *Chota chirayita* in Marathi and *Mamajaka* in Sankrit, has been used traditionally for many diseases. Ayurvedic literature survey, the fresh juice of leaves has been used as a bitter tonic, to control arthritis, to reduce typhoid fever and as cooling agent. It is also used as stomachic and laxative, blood purifier in dropsy, rheumatism, abdominal ulcers, hernia, swellings, itches and insect poisoning. Plant extracts were reported for the biological activities such as antidiabetic, anti – inflammatory, stimulant, astringent and diuretic and useful in skin disease. The plant possesses stimulant, astringent, diuretic anthelmintic properties (The wealth of India, 2002, Raghu Bir, 2006). It is also acts as ethno medicine for snake bite (Garg, 2000).

Terminalia chebula Retz. belongs to the family “Combretaceae”, commonly known as black myrobalan. T. chebula is a medium- to large-sized tree distributed throughout tropical and sub-tropical Asia, including China and Tibet. This tree is found in the forests of northern India, Uttar Pradesh and

Bengal, and is common in Tamil Nadu, Karnataka and southern Maharastra. The traditional Indian systems of Ayurveda and Siddha medicines support the importance of medicinal plants to treat diseases (Beusher et al., 1994). T. chebula is routinely used as traditional medicine by tribals of Tamil Nadu to cure several ailments such as fever, cough, diarrhea, gastroenteritis, skin diseases, candidiasis, urinary tract infection and wound infections (Dash and Bhagwan, 1991). Plant fruits appear to have evolved complex antibiotic compounds to cure various diseases like cancer, cardiovascular, digestive and pathogenic bacteria. Antibacterial activity of T. chebula extracts against several bacterial strains have been reported (Malckzadeh *et al*., 2001; Kim *et al.*, 2006; Chattopadhyay *et al*., 2007; Bag *et al*., 2009). It is effective in inhibiting Helicobactor pylori (Malckzadeh et al., 2001), Xanthomonas campestrispv.citri (Afzalakhtar *et al*., 1997) and Salmonella typhi (Rani and Khullar, 2004). In the present study it was aimed to investigate of ethanolic extract in poly herbal formulation of ethanol induced ulcers rats.

MATERIALS AND METHODS

Animals

Male Wistar albino rats (150-200 g) were procured from Rajah Muthiah Medical College and Hospital, Annamalai University, Chidambaram, Tamilnadu, India and were housed in polycarbonate cages in an animal room for 12 hours day – night cycle. The animals were allowed free access to tap water and standard laboratory rat food. The animal treatment and protocol employed were approved by the Institutional Animal Ethics Committee, Annamalai University (Registration Number - 1102 / 2015 /CPCSEA).

Collection of plant materials

The leaves of *Cayratia pedata, Enicostemma axillare and seed of Terminalia chebula* were collected from kolli hills, Nammakal District. South India. Plant leaves were dried under the shadow. The dried leaves were fine powdered and stored in polythene bags at room temperature (30^0 C) It was authenticated by Dr. V. Chelladurai, Research officer-Botany, Central council for Reasearch in Ayurveda & Siddha, Govt of India. The voucher specimen was numbered and kept in our research laboratory for further reference.

Preparation of extracts

The leaves of *Cayratia pedata , Enicostemma stemma axillare and Terminalia chebula* were cleaned and washed in running water and dried at room temperature for two weeks and then coarsely powdered it with the help of Hand mill. The fine powder was extracted successively in soxhlet apparatus the boiling point of ethanol (1500 ml) was set up at 78^0C. The solvent was recycled, thereby extracting the compounds present in the sample. They were continuously extracted until the solvent loses its color. All the extracts were carefully evaporated in a rotary evaporator under Controlled temperature and reduced Pressure to get the extracts was stored in the refrigerator.

Experimental design

The animals were randomly divided into six groups of five animals each.

Cayaratia peduta, Enicostemma axillare, Terminalia chebula and *Omeprazole* were administrated post orally by intubation once in a day in the morning hours for 6 days.

Group I- Normal control

Group II - Ulcer induced rats
Group III - *Cayaratia pedata* (200 mg/kg b.w)
Group IV - *Enicostemma axillare* (200 mg/kg b.w)
Group V - *Terminalia chebula* (200 mg/ kg b.w)
Group VI - *Omeprazole* (20 mg /kg b.w).

Ethanol induced ulcer model

Thirty Wistar albino rats of either five weighing 150–200 g were divided into six groups. Group-I (normal control) was treated with distilled water. Group-III,-IV and-V rats were treated with *C. peduta*, *E. axillare* and *T. chebula* (200 mg/kg b.w, respectively). In this method, albino rats fasted in individual cages for 36 h. The animals of Group 2 were subjected to ethanol administration (5.0 mL/ kg b.w.) in order to induce ulcers (Hollander *et al.*, 1985) and the animals of Group 6 were subjected to animals Omeprazole (20 mg /kg b.w). Animals were sacrificed 60 min later. The stomach was excised, cut along the curvature and washed with 0.9% NaCl. Ulcer index (UI) was calculated in ethanol-induced rats. For the determination of ulcer file, the stomach was cut open along the more prominent ebb and flow and the internal surface was analyzed for ulceration with the help of a basic dissecting microscope. The ulcer index calculated determined by (Corne *et al.,* 1974). The stomachs were isolated, and the contents were collected and centrifuged. The ulcer index and gastric mucous content were determined (Corne *et al*., 1974).

Determination of free and total acidity in gastric juice (Hawk, 1947).

1ml of gastric juice was pipette into a 100ml conical flask; added 10ml of distilled water the pH of this solution was noted using with the help of pH -Meter, then added 2 to 3 drops of Topfer's reagent and tritrated with 0.01N NaOH (which was previously standardized with 0.01N of oxalic acid) until all traces of the red colour disappears and the colour of solution was yellowish orange. The volume of alkali added was noted. The volume corresponds to free acidity. Then 2 to 3 drops of phenolphthalein solution was added and titration was continued until a definite red tinge reappears. Again the total volume of alkali added was noted. The volume corresponds to total acidity.

Acidity was calculated by using the formula:-

$$\text{Acidity} = \frac{\text{Volume of NaOH X Normality of NaOH X100}}{0.1} \text{ meq/l/100g}$$

Estimation of total proteins (Lowry et al.,1951)

The dissolved protein in gastric juice was estimated in the alcoholic precipitate obtained by adding 90% alcohol with gastric juice in 9:1 ratio. Then 0.1ml of alcoholic precipitate of gastric juice was dissolved in 1 ml of 0.1N NaOH and from this 0.05ml was taken in another test tube, to this 4ml of alkaline mixture was added and kept for 10 min. Then 0.4ml of phenol reagent was added and again 10 min was allowed for colour development. Reading was taken against blank prepared with distilled water at 610nm in Systronics UV-VIS spectrophotometer-180. The protein content was calculated from standard curve prepared with bovine albumin and was expressed in terms of µg/ ml of gastric juice.

Statistical analysis:

All biochemical data were expressed as mean ± SE Statistical analysis was performed using one-way ANOVA followed by Duncantests using SPSS (version 18) of computer software. In all cases, P-value of less than 0.05 was considered to be significant.

Table 1: Effect of ethanolic extract of *Cayratia pedata, Enicostemma axillare and Terminalia chebula* on ethanol induced by gastric ulcer in rats

Groups	Ulcer index	Protection %
Group I- Normal control	17.63 ± 1.14^{e}	-
Group –II-Ethanol	20.69 ± 1.29^{d}	4.85%
Group III- *Cayratia pedata* (200 mg/kg b.w)	13.79 ± 0.72^{b}	7.30%
Group IV- *Enicostemma axillare* (200 mg/kg b.w)	15.20 ± 4.12^{c}	5.11%
Group V- *Terminalia chebula* (200 mg/ kg b.w)	15.53 ± 0.64^{c}	6.43%
Group IV- Omeprazole (20 mg /kg b.w)	12.18 ± 1.33^{a}	8.20%

Values are given as mean±SE from in rats each group, value with different superscript letters (a-e) in the same coloum differ significant at p<0.005 (Duncan)

Table 2: Effect of ethanolic extract of *Cayratia pedata, Enicostemma axillare and Terminalia chebula* on gastric juice, pH, free acidity, total acidity and total protein ethanol induced by gastric ulcer in rats

Groups	Gastric juice	pH	Free acidity	Total acidity	Total protein
GroupI-Normal control	2.13 ± 0.187^{c}	2.830 ± 0.018^{a}	74.12 ± 2.108^{d}	1.53 ± 0.023^{a}	13.7 ± 6.02^{a}
Group II- *C. pedata* (200 mg/kg b.w)	0.816 ± 0.21^{a}	3.66 ± 0.20^{d}	42.72 ± 1.759^{b}	83.31 ± 1.01^{c}	24.19 ± 1.25^{b}
Group III- *E. axillare* (200 mg/kg b.w)	0.881 ± 0.014^{a}	3.33 ± 0.019^{c}	44.42 ± 155^{b}	87.00 ± 2.10^{d}	14.24 ± 1.12^{a}
Group IV- *T.chebula* (200 mg/ kg b.w)	1.44 ± 0.430^{b}	3.045 ± 0.21^{b}	54.80 ± 1.40^{c}	1.066 ± 1.58^{c}	22.46 ± 1.61^{b}
Group V- Omeprazole (20 mg /kg b.w)	0.678 ± 0.040^{a}	3.74 ± 0.189^{e}	35.86 ± 2.90^{a}	77.17 ± 1.43^{b}	23.7 ± 1.63^{b}

Values are given as mean±SE from in rats each group, value with different superscript letters (a-e) in the same coloum differ significant at p<0.005 (Duncan)

RESULTS

The effect of ethanol extract of *Cayratia pedata, Enicostemma axillare* and *Terminalia chebula* leaves on ulcer index and % protection is presented in Table 1. The gastric lesions in the stomach of ethanol- treated rats were significantly higher when compared to the normal control. The pretreatment of rats with *Cayratia pedata, Enicostemma axillare* and *Terminalia chebula* (200 mg/kg b.w) and Omeprazole (20 mg /kg b.w). The mean ulcer index of 17.63±1.14 observed in the control

group which was reduced to 12.18±1.33in the standard drug, indicating significant 81.63% in ulcer at p<0.05. Ulcer index of Cayratia pedata, Enicostemma axillare and Terminalia chebula with (13.79±0.72), (15.20±4.12) and (15.53±0.64) indicating reductions of 81.63%, 121.95% and 37.87% respectively. The effect was found to be comparable to that of omeprazole 20 mg/kg, used as reference standard which indicating % protection of 79.05%. C. pedata, E. axillare and T. chebula at a doses of 200mg/kg b.w significantly (P<0.05), while at doses C. pedata 200mg/kg b.w best significantly (P<0.05), reduced the formation of ulcer.

The effect of ethanol extract of *Cayratia pedata, Enicostemma axillare* and *Terminalia chebula* leaves on gastric juice, PH, free acidity, total acidity and total protein presented in Table -2. The level of gastric juice and pH were found to be control rats 2.13±0.187and 2.830±0.018 respectively. Pretreatment with *C. pedata* (0.816±0.21), *E. axillare* (0.881±0.014) and *T. chebula* (1.44±0.430) significantly reduced. A prominent reduction of *C. pedata* (0.816±0.21) was observed. Pretreatment effects were compared to the standard drug of omeprazole.

The effect free acidity was noted in control rats (74.12±2.108). Pretreatment with *C. pedata* (42.72±1.759), *E. axillare* (44.42±155) and *T. chebula* (54.80±1.40) significantly decreased. A prominent reduction of *C. pedata* (42.72±1.759).Pretreatment effects were compared to the standard drug of omeprazole.

The level of total acidity was noted in control rats (1.53±0.023). Pretreatment with C. pedata (83.31±1.01), *E. axillare* (87.00±2.10) and *T. chebula* (1.066±1.58) significantly decreased. A prominent reduction of *C. pedata*(83.31±1.01). Pretreatment effects were compared to the standard drug of omeprazole.

The level of total protein was noted in control rats (13.7±6.02). Pretreatment with *C. peduta* (24.19±1.25), *E. axillare* (14.24±1.12)and *T. chebula* (22.46±1.61) significantly decreased. A prominent reduction of *C. pedata*(24.19±1.25). Pretreatment effects were compared to the standard drug of omeprazole.

DISCUSSION

In the present study, *C. pedata, E.axillare* and *T.chebula* antiulcer activity was evaluated by employing ethanol induced gastric ulcer models in albino rats. C. pedata, E. axillare and T. chebula pre-treatment showed significant antiulcer activity against gastric ulcers in increasing order of doses. Ethanol prompted gastric lesion formation may be because of stasis in gastric blood stream which adds to the advancement of the discharge and necrotic parts of tissue injury. Alcohol rapidly penetrates the gastric mucosa clearly creating cell and plasma film harm prompting expanded intra cell layer permeability to sodium and water. The gigantic intracellular accumulation of calcium speaks to a noteworthy stride in the pathogenesis of gastric mucosal harm. Liquor instantly infiltrates the gastric mucosa obviously bringing about cell and plasma layer harm driving to increased intra cell film penetrability to sodium and water. The huge intracellular collection of calcium speaks to which leads to cell death and exfoliation. There is much evidence that the ethanol damage to the gastrointestinal mucosa starts with micro-vascular injury, namely disruption of the vascular endothelium resulting in increased vascular permeability, oedema formation and epithelial lifting. These effects are secondary to ethanol induced slowing or cessation of gastric mucosal flow. Ethanol also induces a marked compression of the roundabout muscles of rodent fundic strip. Such a withdrawal may prompt mucosal pressure at the site of the best mechanical anxiety, at the peaks of mucosal folds prompting corruption and ulceration.

The etiology of peptic ulcer is obscure in a large portion of the cases, yet it is by and large

acknowledged that it results from unevenness between forceful components and the support of mucosal integrity through the endogenous resistance systems. To recover the parity, diverse helpful operators including plant concentrates may be utilized (Raju, 2009).

A. indicum concentrate is one such home grown medication utilized as a part of the present concentrate principally to assess the counter ulcerogenic in pylorus ligation and ethanol impelled ulcers in rats. This prompts cell demise and shedding in the surface epithelium. It was seen in this study that the concentrate diminished altogether ethanol-actuated ulcer. This may be because of cytoprotective impact of the concentrate by means of cancer prevention agent impacts. The concentrate indicates insurance against trademark injuries delivered by ethanol organization this antiulcer impact of MEAI may be because of both diminishments in gastric corrosive emission and gastric cytoprotection. The antiulcer property of A. indicum in pylorus ligation model is clear from its huge decrease in free acidity, all out sharpness, number of ulcers and ulcer record. *A. indicum* treated creatures essentially repressed the arrangement of ulcers in the pylorus ligated rats furthermore diminished both the fixation and expanded the pH it is recommended that A. indicum can smother gastric harm impelled by forceful elements.

The system of activity of omeprazole is such that it ties particularly to a solitary subunit of the H +, K +-ATPase at the secretory surface of parietal cell and inactivate it (Munson *et al*., 1995). It reduces acid secretion regardless of the source of secretory stimulation. By expanding intragastric pH through hindrance of corrosive discharge, PPIs hinder initiation of pepsin. They are successful in treating peptic ulcer malady and gastroesophageal reflux with both short and long haul use (Schneeweiss *et al*., 2006). Ethanol upsets the gastric mucosal obstruction and reason significant smaller scale vascular changes with solid vaso-tightening joined by arteriolar dilatation in charge of engorgement of mucosal capillaries (Cho and Ogle, 1992).

As it has been mentioned in (Wasman, *et al.*, 2010) by Goel and Sairam, peptic ulcer is a popular gastrointestinal medical problem despite its vague etiology but the imbalance between aggressive factors like acid and pepsin and defensive factors which lead to maintenance the unity of mucus has been admitted as the main cause of peptic ulcer. Stated by Sezabo, Marhuenda and Mutoh in (Mahmood, *et al*., 2010) ulcer induction by ethanol in experimental rats causes severe injuries in stomach which will begin with micro vascular damages and leads to enhancing in vascular permeability. Direct toxic effect of ethanol prompts necrotic damages to gastric mucosa by decreasing mucus production and diminishing effect on bicarbonates discharge.

The results from the present study suggest that the various extract of *Cayratia pedata* Lam, *Enicostemma axillare* and *Terminalia chebula* exhibited significant Anti-ulcer effect. The most broadly utilized essential test to screen anti-inflammatory agent is to measure the ability of a compound to reduce local oedema actuated in rodent paw taking after the infusion of aggravations, for example, carrageenan (Winter, 1962).The chloroform extract of Cayratia pedata increased absorption of water and electrolyte from the gastrointestinal tract. Consumption of excessive alcohol usually elevates the risk of gastric mucosal damage by generating oxygen-derived free radicals such as superoxide anions, hydroxyl radicals and lipid peroxides (Li et al., 2008 and Pan et al., 2008).

In the present study that the ethanol leaf extract of *C. peduta, E. axillare* and *T. chebula* has an ulcer healing property against experimentally induced ulcers in rats. Hence this study confirms benefits in treatment of ulcer.

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