ANTIOXIDANT ACTIVITY OF SYZYGIUM CUMINI SEEDS IN ASPIRIN INDUCED PEPTIC ULCER IN RATS

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Abstract: In the present study a hydroalcoholic extract of Syzygium cumini seeds have been investigated for its antioxidant activity in aspirin induced peptic ulcer in rats with the aim of exploring possible correlation between its antioxidant and antiulcer activities. Oxygen free radicals are considered to be important factors in the pathogenesis of peptic ulcer. The level of lipid peroxide was elevated and the activities of antioxidant enzymes were reduced considerably by oral administration of aspirin. The decreased level of lipid peroxides and increased activity of antioxidant enzymes were observed with treatment of Syzygium cumini seeds. The results indicated that Syzygium cumini seed may exerts its gastroprotective effect by free radical scavenging action and have considerable therapeutic potential in the treatment of peptic ulcer.

Key words: Antioxidant, Peptic ulcer, Syzygium cumini.

INTRODUCTION

Oxidative stress and free radicals mediated processes have been implicated in the pathogenesis of gastrointestinal disorders [1]. Nonsteroidal anti-inflammatory drugs (NSAID) are recognized as the most common etiological factors associated with peptic ulcer [2]. Aspirin is one of the NSAID which injures the gastrointestinal mucosa because oxygen derived free radicals such as superoxide O$_2$•⁻ anion and hydroxyl radical mediate injury of this mucosa [3].

Syzygium cumini L. (SC) is commonly used in traditional medicine as remedy for treating various diseases. It has been valued in Ayurveda and unani systems of medicine. Seeds are reported to contain jamboline a new phenolic substance, alkaloid jambosine, gallic acid, oleanolic acid, ellagic acid, quercetin, tannins etc [4-8]. The seeds have hypoglycemic [9], antibacterial [10], antiallergic [11] and antidiarrheal [12] effect. According to Ayurveda it is used in the treatment of anthelmintic, bronchitis and asthma [13]. The juice of ripe fruit is used for preparing vinegar that is considered to be stomachic, carminative and diuretic [14]. The extract of seeds which is traditionally used in diabetes has hypoglycemic and antioxidant property in alloxan diabetic rat possibly due to tannins [15].

In the present study, we decided to explore antioxidant activity of Syzygium cumini in aspirin induced peptic ulcer, with the aim of ascertaining any correlation between the antulcer and antioxidant activity of Syzygium cumini which has not been done earlier.

MATERIALS AND METHODS

Plant Material: Seeds of Syzygium cumini were collected from the local region of Nagpur and was botanically identified and confirmed. It was authenticated by Department of Botany, R.T.M. Nagpur University, Nagpur. The specimen was submitted to the herbarium of the same institute Specimen voucher no. 9134. The seeds of Syzygium cumini Linn. were air dried in shade, under normal environmental conditions and then subjected to size reduction to get coarse powder. Coarse powdered material was macerated in ethanol-water (50:50) at
room temperature for seven days. The menstrum collected was again shade dried yielding dried extract.

**Animals:** Albino rats of either sex weighing between 200-250g were used for the present investigation. The rats were housed in a clean polypropylene cage with standard palleted food, and water *ad libitum*. All the rats were kept under the experimental conditions of temperature (25 ± 2°C), humidity (55 ± 2) and light (dark/light-12/12hr). The experimental protocol was approved by institutional animal ethical committee under the guidelines of CPCSEA, New Delhi.

**Chemicals:** The chemicals were purchased from Lobachemie, Burgoyne, and Sigma Aldrich. All other chemicals were of analytical grades.

**Experimental protocol:** Animals were divided into five groups each containing six rats. The animals were kept fasting for 24 hr prior to the experiment but water was permitted *ad libitum*. Group I: Normal control. Group II: Animals received aspirin (400 mg/kg). Group III: Animals received aspirin (400 mg/kg) + hydroalcoholic extract of *Syzygium cumini* (200 mg/kg). Group IV: Animals received aspirin (400 mg/kg) + Ranitidine (50 mg/kg). Group V: Animals received aspirin (400 mg/kg) + Vit E (150 mg/kg). Aspirin and other drugs were given orally.

At the end of the experiments, blood was withdrawn from retro-orbital plexus of all the rats and taken in the centrifuge tube containing anticoagulant. Plasma was separated after centrifugation to get packed cells. The oxidative stress parameter like lipid peroxidation in RBC was determined. The endogenous antioxidant enzymes viz., superoxide dismutase, catalase and reduced glutathione were determined in erythrocyte lysate and blood to find out the extent of oxidative stress. Different assays were carried out by standard methods like Yagi method [16] for lipid peroxidation, Beutler et al. [17] method for reduced glutathione, Markund and Markund method [18,19] for superoxide dismutase and Aebi method [20,21] for catalase assay.

**Statistical analysis:** All values are expressed as mean ± SEM. Data is analyzed by one-way ANOVA followed by Newman-Keuls multiple comparison test. The level of significance was considered at P<0.05.

**RESULTS**

The results obtained from the study are presented in tables 1 and figures 1 to 4. Study shows that lipid peroxidation level in aspirin-induced peptic ulcer group of rats was increased as compared to normal group. Significant decrease in lipid peroxidation was seen in both peptic ulcer group treated with hydroalcoholic extract (200mg/kg) of *Syzygium cumini* and Ranitidine (50 mg/kg) (Table 1; Fig. 1). Figure 1 shows lower level of lipid peroxidation in the group III rats as compared to respective control (Table 1; Fig.1).

The content of reduced glutathione was decrease significantly in aspirin treated group. However, in all the three therapeutic groups glutathione content in blood was raised about two fold as compared to aspirin treated group (Table 1; Fig.2).
Udapurkar et al.

**Fig. 1.** Effect of different extracts of *Syzygium cumini* on levels of lipid peroxidation

**Fig. 2.** Effect of different extracts of *Syzygium cumini* on reduced glutathione content

**Fig. 3.** Effect of different extracts of *Syzygium cumini* on activity of superoxide dismutase

**Fig. 4.** Effect of different extracts of *Syzygium cumini* on activity of catalase
Decrease in antioxidant enzymes, superoxide dismutase and catalase, were observed in aspirin induced group (Table 1). Figures 3 and 4 show increased activity of antioxidant enzymes in group III rats when compared with respective controls. However, the animal groups treated with hydroalcoholic extract of Syzygium cumini or ranitidine or vitamin E along with aspirin (groups III, IV, V) maintained the enzymes level more than respective control groups (Table 1; Figs. 3,4).

**DISCUSSION**

In present study antioxidant capacity of extract of Syzygium cumini seeds was monitored on aspirin-induced peptic ulcer in rats. The preliminary phytochemical screening of extract of Syzygium cumini seeds revealed the presence of tannins in hydroalcoholic extract, which possesses antiulcer and antioxidant activities that protects the gastric ulcers [22].

The oxygen derived free radicals play a key role in the mechanism of aspirin induced gastric mucosal lesions [23]. Aspirin induces the reactive oxygen metabolites in animal models, which may contribute to mucosal injury [24]. The oxidative stress is considered to be an important cause of peptic ulcer. The present results revealed that extracts of Syzygium cumini seeds had significant effect on oxidative stress parameters such as lipid peroxidation, GSH content as well as antioxidant enzymes like superoxide dismutase and catalase.

The hydroalcoholic extract (200 mg/kg) lowered the lipid oxidation and increased antioxidant enzymes SOD, CAT and contents of GSH. These results revealed relaxing the animals from stress as well as the peptic ulcers.

In conclusion, it can be said that Syzygium cumini exhibit protective effect through free radical scavenging properties and reduce oxidative damage caused by aspirin. These results provide additional support for the popular use of this plant as an antiulcer remedy in the Indian traditional medicine.

**REFERENCES**


