

Effect Of Ocimum Sanctum Leaf Extract On Swimming Stress Induced Ulcers In Rats

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Abstract

Ocimum sanctum is a medicinal plant which has been used studied for various properties and used in various conditions. In the present study, ocimum sanctum was investigated for its effects against swimming stress induced ulcers in albino rats. The effects were compared with ranitidine. The leaf extract of ocimum sanctum showed significant antiulcer activity in the dose of 100 mg/kg and 200 mg/kg. The results were comparable to ranitidine though ranitidine was found to be more potent. Ocimum sanctum may be operating by antagonism of H₂ receptors, by antisecretory mechanism or by antioxidant property as an antiulcer agent against stress induced gastric ulcers. Since this drug has been documented to have antiulcerogenic property earlier and has shown significant activity in the present study, more studies are required to explore its complete therapeutic usefulness.

INTRODUCTION

In our study we have used ocimum sanctum (Krishna Tulsi). It is commonly known as Tulsi in hindi and belongs to family Labiatae/Laminaceae. All parts of the plant are useful but leaves, seeds and roots are particularly of importance as medicinal agents. It is a hairy annual herb/undershrub of average height measuring 85 cms^{1,2}. The leaf of ocimum sanctum is elliptical. The leaf powder is green brown in colour and gives an aromatic smell like cloves³.

The plant has been reported to possess various activities like antioxidant^{4,5,6} antiasthmatic^{7,8,9,10}, antistress/adaptogenic¹¹, antipyretic and antiinflammatory¹², antiviral¹³, antibacterial¹⁴, insecticidal and antimalarial^{15,16}, antifungal¹⁴. Ocimum sanctum has also been investigated for its antiulcer activity^{17,18,19,20}. Since studies regarding its antiulcer property are limited, we decide to evaluate its activity against stress induced gastric ulcers and compare the results with ranitidine as no comparison has been done in the previous studies.

MATERIALS AND METHODS

ANIMALS

Albino rats: Animals of either sex, weighing between 120-180 gm were used to study the effect on pyloric ligation induced gastric ulceration.

All the animals were caged under standard conditions and

were allowed to acclimatize to their surroundings for one week before subjecting them to experimentation. Prior to experimentation permission was taken from institutional ethical committee.

DRUGS AND CHEMICALS

Test drug: Fresh leaves of the plant ocimum sanctum were collected during the month of April from a local area in Sevagram and were shade dried and powdered. A hydroalcoholic (70% V/V) extract of this powdered form of ocimum sanctum was prepared. This extract was again shade dried and was used to prepare an aqueous solution in desired concentration just before use every time. The same extract was used for all the experiments.

Ranitidine (Ranbaxy, India): It was diluted in distilled water to get the desired concentration.

METHOD FOR SWIMMING STRESS INDUCED GASTRIC ULCERS IN RATS

The animals were kept fasting for 24 hours but were allowed free access to water before the experiment. They were randomly divided into five groups of six animals each. Group I received distilled water (10ml/kg) orally and served as control whereas group II, III and IV were administered the test drug (ocimum sanctum) in doses of 50 mg/kg, 100 mg/kg and 200 mg/kg respectively. The animals in group V were administered ranitidine (10 mg/kg) orally which served

as standard for comparison.

The rats were forced to swim after 30 minutes of drug treatment inside a vertical cylinder (height 40cms and diameter 20 cms) containing water upto 20cms height approximately. The height of the water column was so adjusted that the rats did not jump out of the cylinder. The temperature of the water was maintained at 28-29C. After 5 hours, the animals were sacrificed with an overdosage of ether anaesthesia. The stomach was taken out, cut open, ulcers were visualized and ulcer index was determined.

STATISTICAL ANALYSIS

Data were analyzed by Student’s t test. The value of t was calculated as the ratio of the observed difference between the two means in comparative groups to the calculated standard error of that difference. The t value corresponding to its probability and the appropriate degree of freedom was read from the table of t distribution. The animals in group II, III, IV and V were compared to animals in group I (control group). All data are expressed as mean + SEM of six animals in each group and P values less than 0.05 are considered significant.

OBSERVATIONS AND RESULTS

Ulcers were induced in 100% animals in the distilled water (10ml/kg, orally) treated control group. In the dose of 50 mg/kg, orally, ocimum sanctum extract did not show protection from ulcers and though a decrease in the number of ulcers and the ulcer index was observed, it was not statistically significant. In the dose of 100 mg/kg, orally, ocimum sanctum extract showed protection from ulcers in 33.34% animals and also significantly (p<0.05) reduced the number of ulcers and the ulcer index. When administered in the dose of 200 mg/kg, orally, ocimum sanctum extract protected 50% animals from ulceration and also significantly (p<0.01 and p<0.05) reduced the number of ulcers and the ulcer index.

In the dose of 10 mg/kg, orally, ranitidine exhibited ulcer protection in 83.34% animals. It decreased the number of ulcers as well as the ulcer index significantly (p<0.001). (Table-1, Fig. 1 A & B).

Figure 1

: Effect of ocimum sanctum extract (OSE) on swimming stress induced gastric ulcers in albino rats

Group (n=6)	Drug	Dose (mg,ml*/kg) (P.O)	Percent animals showing ulcers	No of ulcers/stomach (Mean ± SEM)	Ulcer Index (Mean ± SEM)
I	D.W	10*	100	3.33 ± 0.49	2.00 ± 0.44
II	OSE	50	100	3.16 ± 0.60	1.83 ± 0.39
III	OSE	100	66.66	1.31 ± 0.47*	0.66 ± 0.21*
IV	OSE	200	50	1.00 ± 0.44**	0.50 ± 0.22*
V	RAN	10	16.66	0.50 ± 0.34***	0.33 ± 0.17***

n = Number of animals
P.O = Per orally
SEM = Standard error of mean
D.W = Distilled water
RAN = Ranitidine

*p < 0.05
**p < 0.01
***p < 0.001

Figure 2

: Effect of ocimum sanctum extract (OSE) on swimming stress induced gastric ulcers in albino rats.

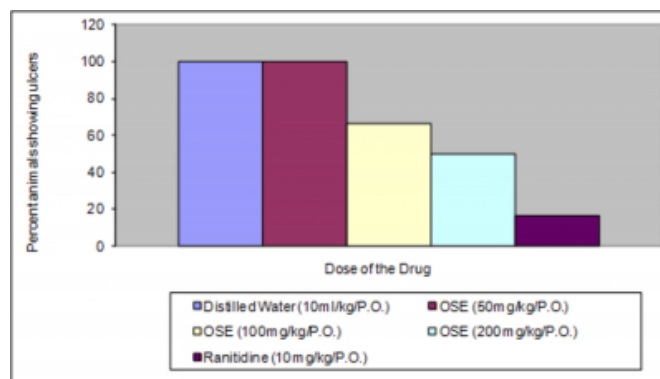
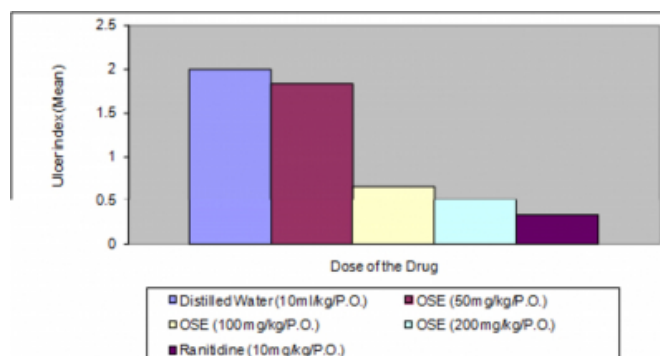


Figure 3



DISCUSSION

The currently available antiulcer drugs either do not produce complete relief or cure or are associated with adverse effects and poor patient acceptability. Therefore, there is always the need to screen and develop better drugs for the treatment of peptic ulcer.

People all over the world are looking to various alternative systems of medicine especially herbal medicines which are non-toxic, claimed to be safe, cost effective and also equally effective in comparison to allopathic drugs.

Thus, with this idea, for our study we chose the medicinal plant *ocimum sanctum* for our study which has been reported to be safe and has been used for various medicinal purposes.

Psychological stress may be an important contributing factor in the causation of peptic ulcer^{23,24}. Stress has also been incriminated as either to cause or exacerbate peptic ulcer. Many stressful situations like burns, brain stem surgery, CNS tumours, trauma, stroke, sepsis, hypotension and even stressful life events may lead to gastric or duodenal ulcers²⁵.

Stress induced ulcers are probably mediated by histamine release with enhancement in acid secretion and a reduction in mucous production. Moreover, vagal overactivity has been suggested to be the principal factor in stress induced ulceration²⁶. Due to stress there is a breakdown in epithelial defense which appears to be due to decreased mucosal blood flow leading to ischemia, local acidosis, free radical formation and impaired rapid restitution. These effects allow back-diffusion of acid and cause further injury²⁷. The antiulcer activity of *ocimum sanctum* against swimming stress induced gastric ulcers in albino rats in the present study might be due to its histamine antagonistic, antisecretory and antioxidant effects. In one of our earlier studies, *ocimum sanctum* decreased plasma malondialdehyde (MDA) and increased serum superoxide dismutase (SOD) levels in which indicates its antioxidant activity²⁸.

Ocimum sanctum has shown significant ulcer protective effect as evident from the decrease in the percent incidence, number and severity of the ulcers in swimming stress induced gastric ulcers in albino rats. The antiulcer activity of ranitidine against stress ulcers is well known and is due to blockade of H₂ receptors. In this study, ranitidine was found to be more potent in comparison to *ocimum sanctum*.

It is therefore inferred that *ocimum sanctum* may be a useful antiulcer agent as shown by our experimental work. In view of its significant antiulcer activity which was comparable to ranitidine, more studies including human will be required to work out the complete potential of this plant in the prevention and treatment of peptic ulcer. Since earlier studies and this present work indicate a promising potential of the drug, it might be a useful agent in the management of peptic ulcer in future.

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