

**ANTI-ULCER ACTIVITY OF *TRITICUM AESTIVUM* ON ETHANOL INDUCED
MUCOSAL DAMAGE (CYTOPROTECTIVE ACTIVITY) IN WISTAR RATS**

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Summary

The juice of *triticum aestivum* (wheatgrass) was investigated for its antiulcer activities in animal models. The wheatgrass juice reduced significantly, the formation of ulcer induced by ethanol. Anti-ulcer activity determined by ethanol induced mucosal damage in wistar rats were carried out, following the oral administration of *triticum aestivum* (wheatgrass juice). The anti-ulcer activity of *triticum aestivum* juice was significant. These results were also comparable to those of Omeprazole, in the dose of 20 mg/kg, the reference drug used in this study. The average ulcer index found in ethanol induced rat was 3.6233 ± 0.2098 , whereas ulcer index in animal treated with omeprazole and wheatgrass juice was found to be 0.75 ± 0.1176 and 1.216 ± 0.1195 respectively.

Keywords: Anti-ulcer activity, *Triticum aestivum*, wheatgrass, ulcer index, cytoprotective activity

Introduction

Drugs which are in use presently for the management of ulcerative conditions present well known side and toxic effects. Moreover synthetic drugs are very expensive to develop since, for the successful introduction of a new product approximately 3000-4000 compounds are to be synthesized, screened and tested, whose cost of development ranges from 0.5 to 5 million dollars. On the contrary many medicines of plant origin had been used since long time without any adverse effects. It is therefore essential that efforts should be made to introduce new medicinal plants to develop cheaper drugs. (1) Plants represent a large untapped source of structurally novel compounds that might serve as lead for the development of novel drugs. (2)

Herbal medicines derived from plant extracts are being increasingly utilized to treat a wide variety of clinical diseases, though relatively little knowledge about their mode of action is available. There is a growing interest in the pharmacological evaluation of various plants used in Indian traditional systems of medicine. Thus, the present investigation was carried out to evaluate the anti-ulcer potential of *Triticum aestivum* (F: Graminae) in experimental animal models. (3)

Wheat, (*Triticum* species) a cereal grass of the *Gramineae* (*Poaceae*) family, is the world's largest edible grain cereal-grass crop. It is commonly 60-150 cm. in height, but may be as short as 30 cm. Stem is tufted, erect or semi-erect to prostrate, generally hollow with thin walls, in stem nodes are present generally 5-7 at 3-4 cm. Leaves are long and narrow having glabrous or hairy on one or both surface.(3,4)

Scientific reports on nutritional analysis of wheatgrass have been published frequently in various journals (5, 6, 7). These reports and the chemical analyses undertaken reveal that wheatgrass is rich in chlorophyll, minerals like magnesium, selenium, zinc, chromium, antioxidants like beta-carotene (pro-vitamin A), vitamin E, vitamin C, antianemic factors like vitamin B₁₂, iron, folic acid, pyridoxine and many other minerals, amino acids and enzymes, which have significant nutritious and medicinal value. (3)

Wheatgrass juice has been proven over many years to benefit people in numerous ways: cleansing the lymph system, building the blood, restoring balance in the body, removing toxic metals from the cells, nourishing the liver and kidneys and restoring vitality as claimed by Dr. Ann Wigmore, U. S. A. founder director of the Hippocrates Health Institute, Boston, U.S.A. She claimed that wheatgrass is a safe and effective treatment for ailments such as high blood pressure, some cancers, obesity, diabetes, gastritis, ulcers, anemia, asthma and eczema (8).

Wheat grass contains chlorophyll. Chlorophyll solutions provide significant relief of pain, reduction of inflammation, and the control of odor for patients with serious mouth diseases, used successfully to treat chronic and acute sinusitis, vaginal infections, and chronic rectal lesions (9).

An ulcer (from Latin *ulcus*) is an open sore of the skin, eyes or mucous membrane, often caused, but not exclusively, by an initial abrasion and generally maintained by an inflammation, an infection, and/or medical conditions which impede healing.

Stomach ulcer disease is common, affecting millions of Americans yearly. The size of a stomach ulcer can range between 1/8 of an inch to 3/4 of an inch. About 20 million Americans develop at least one stomach ulcer during their lifetime. Stomach ulcers affect about 4 million Americans every year. More than 40,000 Americans have surgery because of persistent symptoms or problems from ulcers every year. About 6,000 Americans die of stomach ulcer-related complications every year. Peptic ulcer, also known as PUD or peptic ulcer disease is an ulcer of an area of the gastrointestinal tract that is usually acidic and thus extremely painful.

Chlorophyll has been shown to be extremely effective in speeding the healing of peptic ulcers and wounds, which develop internally in the gastro-intestinal tract. Several studies document the use of chlorophyll in the treatment of ulcers resistant to more conventional therapies. The results are quite impressive. In the Offenkrantz study, 20 of the 27 patients with chronic ulcers were relieved of pain and other symptoms in 24 to 72 hours (10). Since, wheatgrass is a rich source of chlorophyll and chlorophyll has been claimed to have beneficial effect in treatment of ulcer, we also decided to evaluate effectiveness of wheatgrass in ulcer.

Materials And Methods

Plant Material

Certified sample of *Triticum aestivum* (Wheatgrass), was acquired from Wheat Research Center, Gujarat Krushi University, Junagadh, Gujarat. The authenticity of this certified sample was also confirmed by comparing its morphological characters with the description mentioned in different standard texts and floras (11). These wheat variety was grown in plastic trays as per the standard procedure described below (8).

Procedure for growing wheatgrass

- ♣ Adequate quantities of unpolished wheat grain were soaked overnight in water in a container.
- ♣ On the next day, the soaked wheat-grain were spread on the surface of the soil filled in plastic trays. Care was taken so that the grains did not touch one another.
- ♣ A thin layer of soil was sprinkled on the wheat grains and then tray was covered with a newspaper to provide darkness, which helps the sprouting.
- ♣ The tray was kept in a covered balcony. Next day the tray was uncovered to spray on some water and was covered again with the newspaper.
- ♣ Previous step was repeated everyday until sprouting took place, after which the tray was left uncovered and watered everyday for 8 days.
- ♣ On 9th day the wheatgrass was harvested by cutting it with a clean pair of scissors about 1/2" above the surface of the soil.

Preparation of wheatgrass juice

For preparation of wheatgrass juice, 100 gm fresh wheatgrass was crushed with little water and filtered to make 100 ml filtrate.

Animals

Wistar rats weighing 250 – 300 g were deprived of food 18 h prior to the experiment but are allowed free access to water.

Anti-ulcer activity:

Ethanol induced mucosal damage in rats (cytoprotective activity):(12)

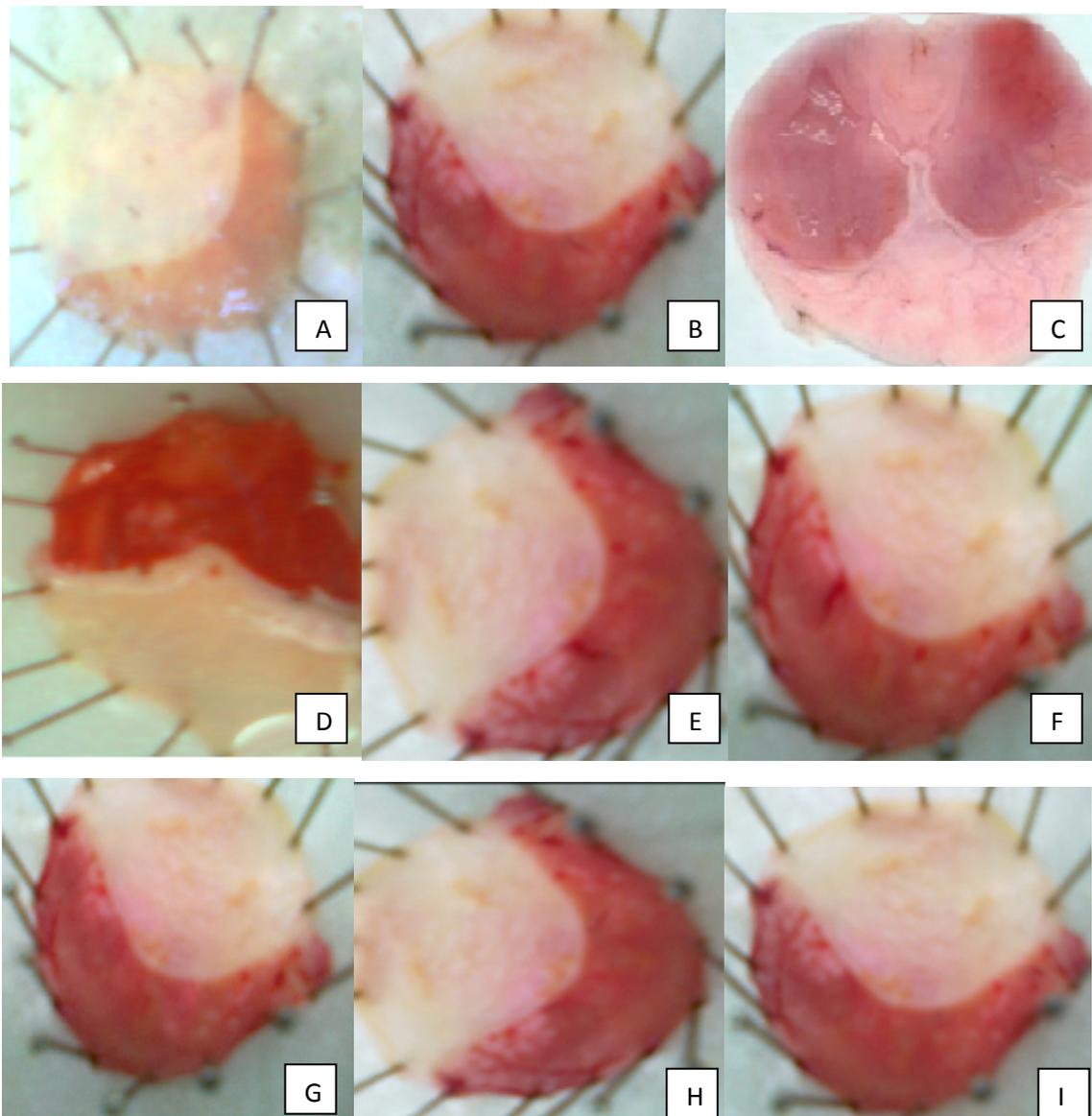
Wistar rats weighing 250 - 300 g were deprived of food 18 h prior to the experiment but are allowed free access to water. Animals of either sex were divided into four groups, each consisting of six rats. One group represented the control group, saline orally, second received absolute ethanol (90%), third groups received wheatgrass juice (1ml) and, Omeprazole (in the dose of 20 mg/kg) were administered orally for fourth group as reference standard drug. During this time they

were kept in restraining cages to prevent coprophagy. The rats were administered wheatgrass juice 30 min prior to administration of 1 ml absolute ethanol. One hour after administration of ethanol, the animals were euthanized with chloroform, the stomachs were excised, cut along the greater curvature, and gently rinsed under tap water. The stomachs were stretched on a wax tray. Ulcer index was determined using following formula:

Ulcer index = $10/x$, where "x" is total mucosal area/total ulcerated area.(13)

Results and Discussion

The parameters studied in this model include ulcer index. Wheat grass juice showed significant reduction in ulcer index (1.216 ± 0.1195) when compared with control group (3.6233 ± 0.2098). Omeprazole did show significant reduction in ulcer index (0.75 ± 0.1176).



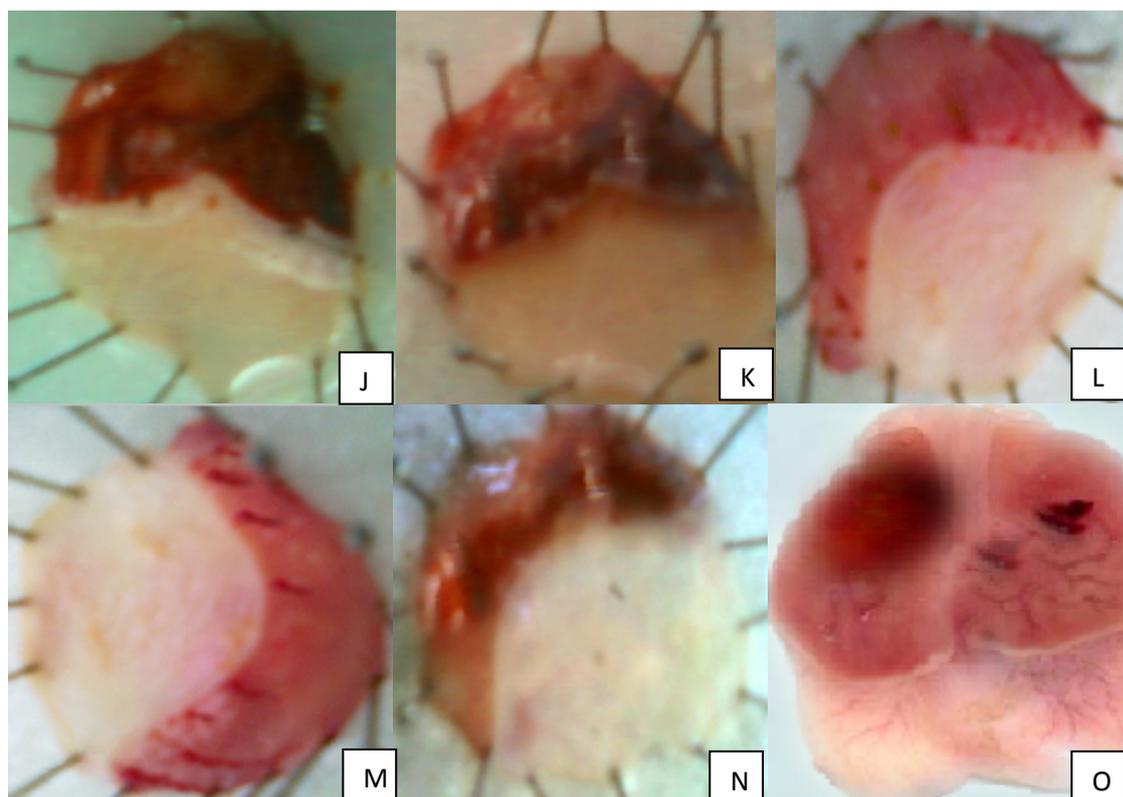


Fig-1: Stomach of **A,B**: Normal Control (only saline was given); **C,D**: Standard Drug (omeprazole) treated animals; **E,F,G,H,I**: Wheatgrass juice treated animals **J,K,L,M,N,O**: Ethanol induced ulcer without treatment

Table -1: Effect of Wheat grass juice against gastric mucosal damage

Animal No.	Ulcer Index			
	Control (Saline)	Ethanol	Standard (Omeprazole 20 mg/Kg)	Treatment (Wheat Grass Juice)
1	0.0	3.07	0.5	1.2
2	0.2	4.06	1.0	0.9
3	0.1	3.50	0.6	1.0
4	0.2	2.98	0.7	1.4
5	0.0	4.02	0.5	1.1
6	0.0	4.11	1.2	1.7
Mean ± SEM	0.08333 ± 0.04	3.6233 ± 0.2098	0.75 ± 0.1176	1.216 ± 0.1195

In normal animals, there were no ulcers found while administration of ethanol produced severe hemorrhagic gastric lesions in positive control group but the pretreatment with wheatgrass juice and Omeprazole 20 mg/Kg significantly reduced the number of ulcers, in comparison with positive control group.

The P value is < 0.0001, considered extremely significant.

Table-2: Summary of Effect of Wheat grass juice on Ulcer Index

Group	Treatment	Ulcer Index	% Protection
I	Control (Saline)	0.08333 ± 0.04	0.00
II	Ethanol	3.6233 ± 0.2098	0.00
III	Standard (Omeprazole 20 mg/Kg)	0.75 ± 0.1176	79.30
IV	Treatment (Wheat Grass Juice)	1.216 ± 0.1195	66.44

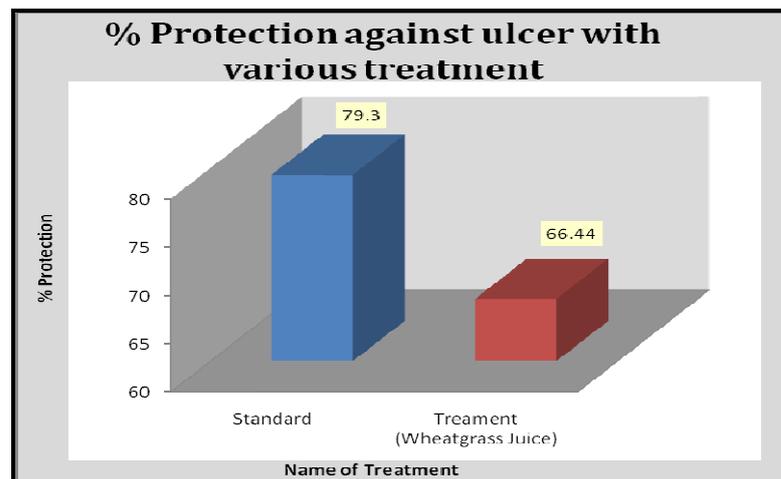


Fig.-2: Effect of various treatments on ulcer index in rats

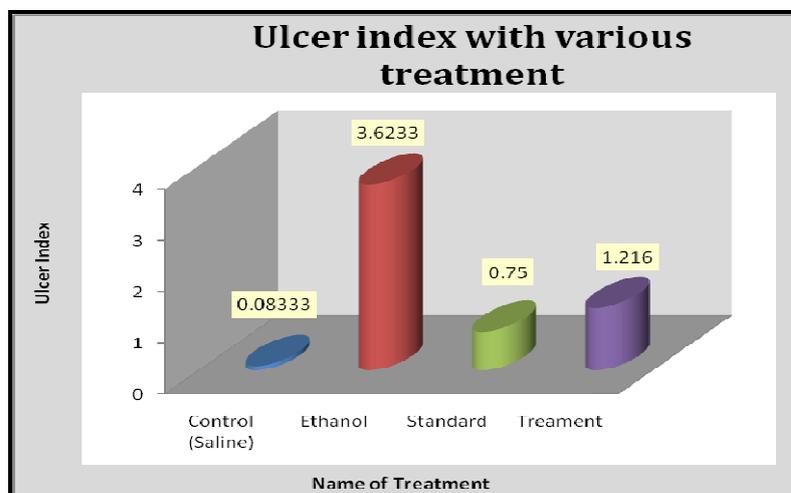


Fig.-2: % Protection with various treatments on gastric mucosal damage

Conclusion

The results of the study have demonstrated that *Triticum aestivum* juice showed strong anti-ulcer activities on the animal models investigated. The study may come up with safe and effective treatments for ulcer.

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