

Anti-inflammatory Activity of Wheatgrass Juice in Albino Rats

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ABSTRACT

To study the anti-inflammatory effect of wheatgrass juice in albino rats. Anti-inflammatory activity of wheatgrass juice was evaluated by using carrageenin-induced rat hind paw edema model for acute study, rexin pellet-induced granuloma in rat model and formalin-induced rat hind paw edema model for chronic study. The results obtained were compared with diclofenac Sodium, standard drug and control. Wheatgrass produced significant anti-inflammatory effect in chronic models. In rexin pellet model, the effect of wheatgrass was more than diclofenac sodium. In formalin-induced rat hind paw edema model, the effect of wheat grass was less than diclofenac sodium. However, the wheatgrass juice showed no significant anti-inflammatory activity in acute models. Wheatgrass juice exhibits anti-inflammatory activity in chronic inflammation.

Key words: Wheatgrass juice anti-inflammatory effect paw edema granuloma diclofenac.

INTRODUCTION

In the traditional system of medicine, many plant-based drugs and formulations are in use since ancient times. However, very little work has been reported on the pharmacological evaluation of the classical formulations for the activities claimed in traditional medicine. One of such formulations is wheatgrass. Wheatgrass is grown commonly world wide. There are many anecdotal and scientific reports claiming the medicinal value of wheatgrass juice. It is one of the main treatment regimen offered by many health institutes which practices naturopathic medicine (e.g. Hippocrates health institute, Boston, U.S.A.). It is claimed to have potential to cure around 350 diseases ranging from common cold to incurable conditions like cancer¹. It is said to be very effective with minimal side effects in conditions like arthritis² and its effectiveness is

attributed to its anti-inflammatory property. However, no scientific study has been done so far demonstrating its anti-inflammatory effect. Hence, in the present study anti-inflammatory effect of wheatgrass juice is investigated.

MATERIAL AND METHODS

Wheatgrass

Wheatgrass is grown in pots without chemical fertilizers and cut when it is 9 to 10 days old. Before extracting the juice out of it, initial weight is weighed and then after extracting juice the residual weight is weighed. The difference between them is considered as the actual weight of the wheatgrass present in the total amount of juice obtained. From this the actual weight of wheatgrass in one ml of the juice is calculated.

Animals

Experiments were performed on albino rats of either sex weighing about 100 to 200 g. They were divided into 3 groups of 6 animals each. One group received the test drug, 1000 mg./kg; second group received diclofenac sodium 10 mg/kg as the standard drug and the third group served as control group and received gum acacia. All the drugs were given orally. All the animal experiments were approved by the ethics committee of the institute.

Carrageenin-induced paw edema in rats

Acute inflammation was produced by sub-plantar injection of 0.1 ml of 1% carrageenin³. Paw volume was measured plethysmometrically at 0 hr and 3 hr after carrageenin injection. Mean increase in paw volume was measured and percentage inhibition in standard group and test group was calculated.

Formalin-induced paw edema in rats

Inflammation was produced by injection of 0.1 ml of 10% formalin into sub-plantar area of rat hind paw^{4,5}. Paw volume was measured plethysmometrically at 0 hr and at the end of 7 days. All the drugs were administered orally 1 hr prior to formalin injection and continued for 7 consecutive days. Mean increase in paw volume was measured and percentage of inhibition in standard group and test group was calculated.

Rexin pellet-induced granuloma in rats

This method was based on the cotton pellet-induced granuloma model in rats^{6,7}. Four sterile rexin pellets of known weight were implanted subcutaneously on the dorsum of rat under light ether anesthesia. Drugs were administered orally

for 7 days. Animals were sacrificed on the 7th day; granulation tissue with rexin pellet was dissected, dried at 60^o c and weighed. Mean increase in the weight of rexin pellet was considered as weight of granulation tissue. Percentage of inhibition of granuloma formation in standard group and test group was calculated.

Statistical Analysis

Statistical analysis was performed using Student's unpaired 't' test and p values less than 0.05 were considered significant. Data are represented as mean \pm SEM.

RESULTS

Carrageenin-induced pedal edema

The anti-inflammatory effect of wheatgrass juice against carrageenin-induced inflammation is shown in Table-1. Wheatgrass caused only 22.62% inhibition of paw volume as compared to the control rats. Diclofenac sodium showed 59% inhibition of paw volume ($p < 0.001$).

Formalin-induced pedal edema

Results obtained are shown in Table 2. Wheatgrass juice showed significant inhibition of edema formation (49.50%) at the end of 7 days ($p < 0.05$) but was less compared to diclofenac sodium 59.37% ($p < 0.01$) inhibition.

Rexin pellet-induced granuloma

Results are shown in Table 3. Wheatgrass juice produced significant inhibition of granuloma formation 54.2% ($p < 0.001$), comparable to that of diclofenac sodium 49.50% ($p < 0.001$).

Table 1: Effect of wheatgrass on carrageenin – induced rat hind paw edema

Treatment	Dose(mg/kg) p.o	Mean increase in paw volume in ml	Percentage inhibition of paw edema
Control		0.61 \pm 0.033	-
Wheatgrass	1000 mg/kg	0.47 \pm 0.016	22.95
DiclofenacSodium	10 mg / kg	0.25 \pm 0.071	59.01

Values are expressed as mean \pm SEM; number of animals used are 6 in each group

Table 2: Effect of wheatgrass on formalin - induced rat hind paw edema

Treatment	Dose(mg/kg) p.o	Mean increase in paw volume in ml	Percentage inhibition of paw edema
Control		0.16 ± 0.026	-
Wheatgrass	1000 mg/kg	0.095 ± 0.076	40.62
Diclofenac Sodium	10.0 mg / kg	0.065 ± 0.018	59.37

Values are expressed as mean ± SEM; number of animals used are 6 in each group

Table 3: Effect of wheatgrass on rexin pellet - induced granuloma in rats

Treatment	Dose(mg/kg) p.o	Mean increase in the Weight of rexin pellets	Percentage inhibition of granuloma formation
Control		94.27 ± 0.051	-
Wheatgrass	1000 mg/kg	43.17 ± 0.007	54.20
Diclofenac Sodium	10.0 mg / kg	47.6 ± 0.034	49.50

Values are expressed as mean ± SEM; number of animals used are 6 in each group.

DISCUSSION

There are many anecdotal and scientific reports claiming the medicinal value of wheatgrass. Most of the beneficial effects of wheatgrass juice are attributed to its chlorophyll content. Wheatgrass is the richest source of chlorophyll, containing around 70%. It is reported that chlorophyll is effective against cancer^{8,9}, against hazards of radiation^{10,11}, possess antimicrobial action^{12,13}, and wound healing property^{14,13}.

The results of the present investigation suggest that wheatgrass juice has significant anti-inflammatory activity against chronic models like rexin pellet-induced granuloma in rats and formalin-induced rat hind paw edema.

Rexin pellet-induced granuloma model represents the exudative and proliferative phase of inflammation. Kinin is said to be the main mediator of granuloma as it both vasodilates and increases vascular permeability in early stages of inflammation. Wheatgrass juice showed significant activity against granulation formation. It might be acting by inhibiting kinin formation. And also

probably by inhibiting migration of eosinophils, neutrophils and platelets.

Formalin-induced pedal edema in rat hind paw is one of the suitable test procedure to screen anti-inflammatory and also anti-arthritis agents^{5,15}, as it closely resembles human arthritis. The experiment is associated with proliferative phase of inflammation. Wheatgrass juice showed significant anti-inflammatory activity in this model. These findings justify the utilization of wheatgrass juice in traditional medicine for the treatment of chronic inflammatory conditions particularly those associated with arthritis.

In carrageenin-induced rat hind paw edema model wheatgrass juice showed very minimal activity. This model represents the acute inflammation; therefore wheatgrass might not be effective in acute inflammatory conditions.

It is concluded that wheatgrass possess significant anti-inflammatory activity in chronic inflammation comparable to that of diclofenac sodium.

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