

Phytochemical and Pharmacological Potential of Wheat Herb (*Triticum aestivum*): A Review

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Abstract

This review emphasizes on the evaluation pharmacological potentials along with the chemistry and chemical constituents. Wheat (*Triticum species*) is an oat herb belonging to Gramineae (Poaceae) family. It is world's most consumable grain cereal crop that has been utilizing since ancient time. Traditionally, it has been utilized among patients with chronic ailments such as Asthma, Atherosclerosis, Parkinson's disease, Joint Pains, Constipation, Hypertension, Diabetes, Insomnia, Bronchitis, Sterility, Haemorrhage, Obesity, and Flatulence problems. Wheat has been a significant food source in the human eating routine for over 8000 years in Europe, Anatolia, West Asia also, north Africa. It is a rich source of alkaloids, carbohydrates, saponins, proteins, flavonoids etc. It can be effective in the cure of diverse illnesses. Plants are high in antioxidant phytochemical compounds such vitamins, terpenoids, phenolics, lignins, tannins, flavonoids, quinines, alkaloids, and other metabolites. Wheat herb has been reported for numerous pharmacological potentials such as anti-genotoxic, anticancer, anti-inflammation, anti-diabetic, antacid, anti-hyperlipidemic, iron-chelating, fertility booster, anti-hypertensive, anti-oxidant, immunomodulatory and anti-hyperlipidemic property. It was also found effective in the cure of depression and Alzheimer's disease. Wheat grass (*Triticum aestivum*) assumes a critical part in medical system for human and animals. In conclusion, it has been used an extensive plant in the treatment of various illnesses due to its unique medicinal properties with easy availability.

Keywords: *Triticum aestivum*; Gramineae; Flavonoids; Genotoxic; Fertility-booster

Introduction

Wheat grass juice has been scientifically verified and has been used to cure a variety of ailments and disorders since ancient times. Wheatgrass, when consumed as part of a raw food diet, is thought to provide numerous health benefits, including the removal of toxins from the body and the provision of a proper nutrient balance as a supplemental nutrient [1]. Wheatgrass juice is known as “green blood” because it includes a high amount of chlorophyll (70%), antioxidants, active enzymes, vitamins, and other essential minerals that help the lungs and heart operate better. Wheatgrass juice is also used as a supplement to strengthen the human body and increase the immune system. It’s a nutritious plant that’s used to treat cancer, diabetes, ulcers, rheumatoid arthritis, hyperlipidaemia, thalassemia, anaemia, kidney stones, asthma, digestive issues, and skin ailments. Wheatgrass has anti-diabetic, anti-allergic, antioxidant, anti-ulcer, anti-cancer, hepatoprotective, cardio-tonic, anti-inflammatory, and anti-arthritis effects pharmacologically [2].

Wheat (*Triticum species*) is an oat grass of the Gramineae (Poaceae) family- world’s most consumable grain cereal grass crop. As of now, wheatgrass is rapidly becoming perhaps the most broadly utilized supplemental wellbeing food varieties and is accessible in numerous wellbeing food stores as new produce, tablets, frozen squeeze, and powder. Wheatgrass gives a concentrated measure of supplements, including iron; calcium; magnesium; amino acids; and nutrients A, C and E and huge sums (70%) of chlorophyll. A few defenders promote wheatgrass as a therapy for malignant growth, ulcerative colitis and joint torment, and furthermore fill in as cell reinforcement. It has been recommended that wheatgrass has a more prominent healthy benefit than a few ordinary food varieties, and ingesting wheatgrass is tantamount to eating a lot of vegetables [3]. Wheat has been a significant food source in the human eating routine for over 8000 years in Europe, Anatolia, west Asia also, north Africa. Wheat is the main food crop become worldwide and one of the ‘huge three’ cereal harvests, with more than 600 million ton being reaped every year. Bread wheat is a significant wellspring of plant sterols in the human eating routine. Turkey is one of the significant wheat creating nations on the planet. In the 2011-2016 period, Turkey created around 21.03 million tons of wheat [4].

Traditional uses

Patients with following mentioned chronic ailments are preferred to use wheat grass therapy –

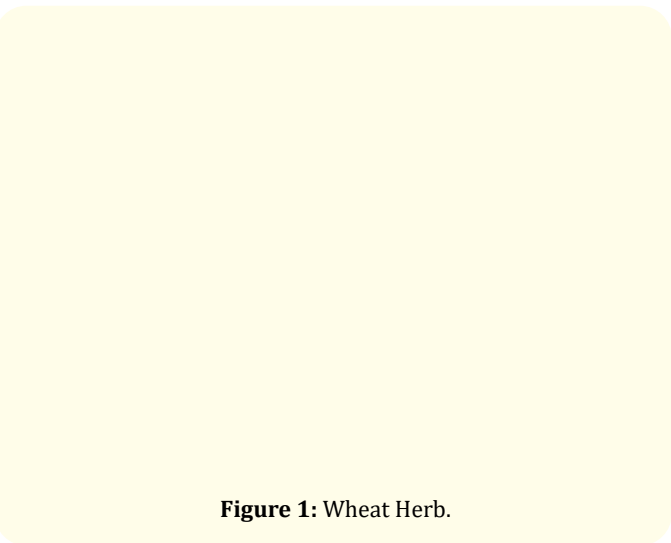


Figure 1: Wheat Herb.

- Asthma
- Atherosclerosis
- Parkinson’s disease
- Joint Pains
- Constipation
- Hypertension
- Diabetes
- Insomnia
- Bronchitis
- Sterility
- Haemorrhage
- Obesity

It can also help with cancer treatment [5]. Wheatgrass has been shown in animal studies to provide cancer-prevention and treatment effects, as well as benefits to immunological function and oxidative stress.

Wheatgrass has been shown in clinical trials to treat rheumatoid arthritis, ulcerative colitis, haematological illnesses, diabetes, obesity, and oxidative stress, as well as induce synergistic benefits to chemotherapy and reduce chemotherapy-related side effects. All of the trials, however, were tiny, and a number of methodological issues developed [6].

Classification of wheat grass [7]

Kingdom: Plantae
 Division : Magnoliophyta
 Class: Liliopsida
 Order: Poales
 Family: Poaceae
 Subfamily: Pooideae
 Tribe: Triticeae
 Genus: *Triticum*
 Species: *aestivum*

Chemical constituents

Wheat herb have demonstrated for having a numerous beneficial moiety essential in the normal functioning of the immune system, fertility and maintaining energy level. The following table depicts the total nutritional value in the juice of wheatgrass [8].

Nutrient	Amount
Carbohydrate	361 ± 5.65
Total sugars	17.75 ± 1.06
Reducing sugar	13 ± 0.707
Acidity (%)	0.25 ± 0.014
Brix value	3.0 ± 0.05
Ash content (%)	14 ± 0.283
Moisture content (%)	3.5 ± 0.071
Fats (%)	5.45 ± 0.212
Crude Protein Content (%)	21.87 ± 1.252
Crude Fibres (%)	1.4 ± 0.085

Table 1: List of nutrients with amount.

It is a rich source of alkaloids, carbohydrates, saponins, proteins, flavonoids etc. It can be effective in the cure of diverse illnesses. Plants are high in antioxidant phytochemical compounds such vitamins, terpenoids, phenolics, lignins, tannins, flavonoids, quinines, alkaloids, and other metabolites [5].

The following table affirms the presence of chemical constituents found in wheatgrass [7,9].

S.N.	Chemical constituents	Observations
	Alkaloids	+
	Carbohydrates	+
	Saponins	+
	Gums, Mucilage	+
	Proteins	+
	Tannins	+
	Flavonoids	+
	Cardiac glycosides	+
	Terpenoids	+
	Steroids	+

Table 2: List of Chemical Constituents.

Pharmacological properties

Fertility booster

Three groups of eight rats were used in the experiment. The first group (G1) was fed a typical American diet. The identical feeding regimen was employed in the second (G2) and third (G3) groups (G3). In all groups, the results equated to normal values for essential organs like the liver and renal functioning. Aspartate aminotransferase (AST) levels in G1, G2, and G3 were 27.88 2.10, 22.50 4.93, and 23.25 4.71/ml, respectively. The testosterone hormone was found to be higher in G3 (2.90 0.26 ng/ml) than in the usual negative control (2.78 0.23 ng/ml) and pharmaceutical formula control sample (2.04 0.40 ng/ml). Follicle-stimulating hormone (FSH) levels dropped to 1.44 0.28 IU/L and 1.45 0.24 IU/L in G3 and G2, respectively, from 1.65 0.23 IU/L in G1 [10].

Antioxidant

The anti-hyperglycemic, hypolipidemic and cell reinforcement impact of watery concentrate of *Triticum aestivum* grass were assessed in two unique models of T2DM in wistar pale skinned person rodents, for example, High Fat Diet with Low portion STZ and High Fructose Diet models. Two models of insulin obstruction were utilized (single i. p infusion of STZ (45 mg/kg) with high fat eating routine and fructose 10% w/v, p. o, not indispensable). Strategies and Material: STZ with high fat eating routine and fructose 10% w/v, p. o, in rodents was regulated for a time of 21 days. Three dosages of TAGE (40, 60 and 80 mg/kg, p. o) were utilized. Pioglitazone (PG) 20 mg/kg was utilized as the reference standard [11,12].

Anti-hypertensive

In recent research, the glucose lowering effects of the *Triticum aestivum* aqueous extracts was studied at doses higher than 50 mg/kg body weight compares to that of glibenclamide. The results obtained in evaluation of chronic toxicity of *Triticum aestivum* aqueous extracts oral administered at high non-therapeutic doses, indicated that the *Triticum aestivum* aqueous extracts does not contribute to any toxicity effects post chronic consumption. In conclusion, aqueous extracts of *Triticum aestivum* at therapeutic doses has high anti-hyperglycaemic ability and is nontoxic. The phytochemicals present in the aqueous extract of *Triticum aestivum* has proven therapeutic properties and contribute to the total therapeutic effects experienced with *Triticum aestivum* [13].

Anti-diabetic

Diabetes mellitus (DM) is a metabolic problem wherein sugar, protein and lipid digestion are not as expected controlled by insulin. Numerous native therapeutic plants have been effectively used to oversee diabetes. Notwithstanding, the utilization of dietary administration is most upheld. Accordingly, the point of this examination was to assess the antihyperlipidemic capability of wheat-based eating routine in alloxan-initiated diabetic rodents. Forty (40) pale skinned person rodents (*Rattus norvegicus*) were gathered into four with ten (10) creatures in each. Diabetes was actuated by the intra-peritoneal infusion of alloxan monohydrate (150 mg/kg body weight). There was a huge decrease ($p < 0.05$) in the convergence of glucose, fatty oils, cholesterol, LDL cholesterol, VLDL cholesterol and a huge increment ($p < 0.05$) in the degree of HDL cholesterol [14].

Anti-carcinogenic

The advancement of skin carcinogenesis was surveyed by histopathological investigation. Decreases in tumor size and combined number of papillomas were seen due to rutin treatment. Normal inactive period was altogether expanded when contrasted with cancer-causing agent treated control. Rutin created critical reduction in the movement of serum compound serum glutamate oxalate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), soluble phosphatase (ALP) and bilirubin when contrasted and the control. They essentially expanded the degrees of compound associated with oxidative pressure glutathione (GSH), superoxide dismutase (SOD) and catalase. The raised degree of lipid peroxidase in the benchmark group was essentially restrained by rutin organization [15].

Antacid (*in-vitro*)

Rough fluid and ethanolic leaf concentrates of *T. aestivum* L. and *H. vulgare* L. were evaluated for *in vitro* stomach settling agent movement utilizing the primer stomach settling agent test, assurance of corrosive balance limit, corrosive killing impact, term of predictable balance, and buffering limit. Consequences of the primer stomach settling agent test showed that the fluid concentrates would be advised to acid neutralizer potential than the ethanolic removes. Among the concentrates, *T. aestivum* fluid concentrate showed the strongest action *in vitro* stomach settling agent movement, with corrosive balance limit of 0.0763 ± 0.0028 mmol H⁺, corrosive killing impact 0.043 ± 0.006 ΔpH, term of balance 22 ± 1.732 min, and buffering limit of 0.0801 ± 0.0331 mmol H⁺/ΔpH [16].

Immunomodulation

This investigation utilized wheatgrass juice and powder to prove the case that wheatgrass is a viable anticancer specialist. Researchers figured another extraction methodology to segregate compounds and, in this way, assessed their bioactivities, especially their immunomodulatory and against malignancy exercises. The two mixtures showed special attributes as for their liquefying focuses, shadings, scents and solubilities. These 2 novel mixtures, a ketone (WG1) and a polyphenol (YWG), displayed solid *in vivo* immunomodulatory lymphocyte multiplication and strong *in vitro* cytotoxic exercises against bosom, pancreatic, colon, lung, and prostate disease cell lines [17].

Iron chelation

The active elements of wheat grass were separated and cleansed by cation trade segment chromatography followed by High Performance Liquid Chromatography. *In vitro* explores different avenues regarding phenylhydrazine treated red platelet hemolysate were done previously, then after the fact treatment of sanitized part of *T. aestivum* to examine iron chelating action. In results, purified part of *T. aestivum* treated red platelet showed critical hindrance of free responsive iron creation and development of thio-barbituric corrosive receptive substances when contrasted with desferrioxamine treated hemolysate [18].

Anti-inflammatory

Wheat grass juice display calming, wound healing and smell lessening abilities. Chlorophyllin has bacteriostatic properties

supporting injury mending, and invigorates the creation of haemoglobin and erythrocytes in pale creatures. It has been utilized to treat different sorts of skin sores, consumes and ulcers where it goes about as an injury mending specialist, invigorating granulation tissue and epithelization [19].

Anti-hyperlipidemic

The effects of wheat grass on rabbits with hyperlipidemia caused by a high-fat diet were investigated in this study. Over the course of ten weeks, thirty rabbits were separated into three groups of ten, with group I getting a control diet, group II a high-fat diet, and group III a high-fat diet combined with wheat grass. Total cholesterol (TC), HDL, malondialdehyde (MDA), reduced glutathione (GSH), and vitamin C were measured in fasting serum samples from the animals, and the results were compared. Hyperlipidemia and oxidative stress were both increased by the high-fat diet, as evidenced by a large increase in MDA levels, whereas antioxidant levels of GSH and vitamin C were dramatically lowered. Wheat grass supplementation combined with a high-fat diet enhanced lipid levels (decreased total cholesterol and increased HDL-C), as well as MDA levels, GSH levels, and vitamin C levels. These findings point to wheat grass's significance in reducing hyperlipidemia and the oxidative stress that comes with it [20].

Antigenotoxic

The study used two dosages of Wheatgrass (WG) powder (WG-250 and WG-500 mg/kg). Pretreatment with WG for 14 days (oral) was followed by induction of genotoxicity with CP (40 mg/kg) 24 hours before sacrifice. The study used a mouse bone marrow chromosomal aberration assay and a micronucleus assay. Hepatic antioxidant enzymes' activities were also studied. One way ANOVA was used to evaluate the data, followed by Tukey's test (P0.05). The results demonstrated that CP caused cytotoxicity in mouse bone marrow cells by increasing the average proportion of aberrant metaphases, Chromosomal Aberrations (CAs) excluding gaps, and Micronuclei (MN) production in polychromatic erythrocytes. CP also significantly reduced glutathione (GSH) and raised malondialdehyde (MDA) levels, as well as inhibiting the activities of Superoxide Dismutase (SOD). According to our findings, WG protects against genotoxicity and oxidative stress caused by CP [21].

Antidepressant

The possible antidepressant impact of Ethanolic extract of Wheatgrass was evaluated using chronic models of Tail suspension test (TST) and Forced Swim Test (FST) in Swiss Albino rats. Wheat grass was gathered, and Ethanolic extract was obtained by utilizing a Soxhlet device to extract dried wheat grass. Wheatgrass extract had antidepressant activity that was comparable to that of the standard medication. Wheatgrass extract was found to be similar to standard medications at doses of 100 mg/kg and 200 mg/kg, respectively. Preliminary phytochemical analysis of Wheatgrass ethanolic extract reveals the presence of flavonoids, alkaloids, saponins, tannins, terpenoids, sterols, and other compounds. The findings of this study suggest that Wheatgrass could be used as an adjuvant in the treatment of depression [22].

Alzheimer's disease

Aluminum chloride (4.2 mg/kg) was used to cause memory impairment, and memory function was tested using the Morris water maze test. Wistar rats were given wheat grass (100 mg/kg, p.o.) and aluminum chloride for 28 days to investigate its activity. After the treatment, the biochemical measures of oxidative stress in the brain were measured. The study's main finding was that aluminum increased oxidative stress. Wheatgrass significantly improved oxidative stress reduction by lowering malondialdehyde levels while increasing superoxide dismutase and catalase levels. Wheat grass was found to have antioxidant properties, and this surprising function could be used to treat Alzheimer's disease [23].

Conclusion

Wheat grass (*Triticum aestivum*) assumes itself as most versatile plant having different parts in medical system for human and animals. Wheat is a significant part of the human eating regimen, and the impact on human strength of bioactive mixtures present in wheat. The valuable impacts of wheat are still need to be investigated of potential wellbeing advancing parts present in the grains and the intricacy of contemplating their organic impacts. Wheat herb has been reported for numerous pharmacological potentials such as anti-genotoxic, anticancer, anti-inflammation, anti-diabetic, antacid, anti-hyperlipidemic, iron-chelating, fertility booster, anti-hypertensive, anti-oxidant and anti-hyperlipidemic property. In conclusion, it has been used an extensive plant in the treatment of various illnesses due to its unique medicinal properties with easy availability.

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Nil.

Conflict of Interest

Authors declare for none conflict of interest.

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