

A Study on Wheat Grass Juice (Green Blood) as a Functional Food

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Abstract— This study aims to figure out that how human beings are benefitted by wheat grass juice which provide all the required nutrients and medicinal benefits for a healthy body and also wheat grass juice consider as a functional food. Wheat grass juice is a food prepared from the cotyledons of the common wheat plants, *Triticum aestivum* Linn (subspecies of family poaceae) which is freshly juiced or dried in to powder for human consumption. It is commonly known as green blood due to its high chlorophyll content which accounts for 70% of its chemical constituents. Wheatgrass contains many vitamins, minerals, antioxidants and trace elements, including selenium, and all 20 amino acids. It also contains the hormone abscisic acid (also called: dormin) the antioxidant enzyme SOD (Superoxide Dismutase) and over 30 other enzymes, the antioxidant enzyme cytochrome oxidase, laetrile and a whole lot of other nutrients. The vitamin content makes it an important adjuvant in anti-allergic and anti-asthmatic treatment, while the enzymes play a pivotal role in the anticancer approach of this herbal drug. A notable feature of the wheatgrass juice is its bioflavonoid content which are the naturally occurring antioxidants and account for many of its clinical utilities such as management of inflammatory bowel disease and as a general detoxifier.

Key words: Wheat Grass Juice, *Triticum Aestivum* Linn, Chlorophyll, Abscisic Acid, Superoxide Dismutase, Bioflavonoid

I. INTRODUCTION

Wheatgrass refers to the young grass of the common wheat plant, *Triticum aestivum* Linn., family Poaceae (Graminae). It contains no wheat gluten. Wheat grass is, by composition considered as super food. This is due to wheat grass's heavy concentration of chlorophyll, vitamins, minerals, enzymes. It is also known as "living food" and is a superior source of chlorophyll. Various chlorophyll-rich greens are being used from variable sources, since prehistoric times, as blood builders. Three most important effects of wheat grass on the human body are: blood purification, liver detoxification and colon cleansing. Wheat grass therapy is recommended for patients suffering from chronic diseases like Asthma, Atherosclerosis, Parkinson's disease, Joint pains, TB, Constipation, Hypertension, Diabetes, Bronchitis, Insomnia, Eczema, Sterility, Hemorrhage, Obesity and Flatulence. It is also useful in the treatment of cancer. In latest Dr Wigmore (2016) reported that wheat grass contain abscisic acid and laetrile both have anticancer activity.

A. Taxonomy of Wheat: (Common Wheat, sp)

- Kingdom: Plantae-Plants
- Subkingdom: Tracheobionta-Vascular plants
- Superdivision: Spermaphyta-Seeds plants
- Class: Liliopsida-Monocotyledons
- Subclass: Commelinidae
- Order: Cyperales
- Genus: *Triticum*-wheat

- Species: *Triticum aestivum*- common wheat



Fig. 1: Wheat grass

II. HISTORY

According to Wikipedia, the free encyclopedia, Wheat grass can be traced back in history over 5000 years, to ancient Egypt and perhaps even early Mesopotamian civilizations. It is purported that ancient Egyptians found sacred the young leafy blades of wheat and prized them for their positive effect on their health and vitality.

The consumption of wheatgrass in the Western world began in the 1930s as a result of experiments conducted by Charles Schnabel in his attempts to popularize the plant. By 1940, cans of Schnabel's powdered grass were on sale in major drug stores throughout the United States and Canada^[3]

A. Nutritional Composition of Wheat Grass Juice

Wheatgrass contains many vitamins, minerals, antioxidants and trace elements, including selenium, and all 20 amino acids. It also contains the hormone abscisic acid (also called: dormin), the antioxidant enzyme SOD (Superoxide Dismutase) and over 30 other enzymes, the antioxidant enzyme cytochrome oxidase, laetrile and a whole lot of other nutrients. The vitamin content makes it an important adjuvant in anti-allergic and anti-asthmatic treatment, while the enzymes play a pivotal role in the anticancer approach of this herbal drug.

Nutrient	Wheatgrass Juice
Protein	860 mg
Beta-carotene	120 IU
Vitamin E	880 mcg
Vitamin C	1 mg
Vitamin B ₁₂	0.30 mcg
Phosphorus	21 mg
Magnesium	8 mg
Calcium	7.2 mg
Iron	0.66 mg
Potassium	42 mg

Table 1: Nutrient of 1 oz (28.35 g) of wheatgrass juice
Above data is collected from
<http://en.wikipedia.org/wiki/wheatgrass>

Amino acid	Amount(μg/ml)
Threonine	105.8
Valine	272.1
Methionine	14.0
Isoleucine	145.1

Leucine	101.0
Phenylalanine	200.9
Lysine	174.5
Histidine	232.2
Tryptophan	160.1
Arginine	252.9

Table 2: The contents of essential amino acids in Wheat Grass Juice

(Above data is collected from journal by M.Chauhan, P-ISSN 2348-8528)

B. Wheat grass juice as a functional food

According to USDA- ARS, Functional foods are” designed to have physiological benefits and or reduce the risk of chronic disease beyond basic nutritional functions and may be similar in appearance to convectional food and consumed a part of regular diet.

Wheat grass juice is a functional food because its have physiological benefits and reduce the risk of chronic disease. The properties of Wheatgrass are

- The implants (enemas) are great for healing and detoxifying the colon walls. The implants also heal and cleanse the internal organs. It was seen that wheatgrass juice therapy decreased the total volume of blood transfused and increased the intervals between blood transfusions of the entire study cohort. These analyses suggested that not only is this therapy effective, but also that the benefit is related to the duration of the wheatgrass juice therapy. The beneficial effects of this therapy have been attributed to its rich nutritional content that includes antioxidant vitamins (C&E) and bioflavonoids. The effects of the wheatgrass juice therapy may be due to the action of natural antioxidants on red blood cell (RBC), antioxidant function and corresponding effects on cellular enzyme function and membrane integrity.
- Wheat grass therapy is most effective in the case of digestive disorders i.e. it shows its quick effect. Constipation, indigestion, flatulent, nausea, vomiting, acidity, ulcers in the stomach and intestines, smelling on the intestines and worms are some of the prominent diseases. It is an excellent laxative in the severity of rectal bleeding.
- No serious side effects were found Grass juice appeared effective and safe as a single or as added support to treat active ulcerative colitis.
- This enema is very helpful in disorders of the colon, mucous and ulcerative colitis, chronic constipation and bleeding piles.
- Wheatgrass juice is an effective healer because it contains all minerals known to man, and vitamins A, B-complex, C, E, I and K. It is extremely rich in protein, and contains 17 amino acids, the building blocks of protein. For several above reason it is consider as functional food.

III. METHODOLOGY

For growing wheat grass, it will sown in soil directly or in a tray which fill by soil. Red soil and cow dung as a manure will be preferable.

According to research by VIT university (2012), the best procedure to cultivate wheat grass is that seeds of wheat will rinse with tap water 3-4 times prior to soaking. After rinsing, seeds will soak in water mixed with one table spoon baking powder for 15 hours. Draining of seeds is carried out for duration of 15 hours after which the seeds will found to be sprouted. Wheat grass trays are prepared using the red soil and cow dung manure mixed in a ratio of 2:1. Sprouted seeds will evenly spread over the soil in tray preventing there the overlapping and increasingly proximity between the seeds. In daily manner, some water will be sprinkle in soil. Some days later, when wheat grass will reach to a height above 7,” it will be harvested. Later the wheat grass juice will extract by cold extraction process with water. Next the juice will be centrifuge and filter to remove suspended matters. This wheat grass can be also crushed in the electric juicer or mixer to extract juice.



Fig. 2: Extracting wheat grass juice with a manual juicing machine

A. Wheat Grass Relation with Chlorophyll as Green Blood

The analogy between chlorophyll and hemoglobin can be demonstrated with respect to the structure of their porphyrin heads. The structure of both the compounds depicts a striking similarity in having a tetrapyrrole ring structure, the only difference between the two being the nature of the central metal atom - magnesium (Mg) in chlorophyll and iron (Fe) in hemoglobin. The apparent resemblance between the two is thus considered to be responsible for the therapeutic effects shown by chlorophyll in conditions involving deficiency of hemoglobin.

- Hemoglobin and its congeners are protein bodies which act as the oxygen carrier in higher animals by binding two electrons attached to the oxygen molecule, whereas chlorophyll is the active metabolic agent in plants which assimilates carbon from the carbon dioxide of the atmosphere by producing two electrons which are then transmitted through electron transport chain.
- The structural similarity between the two compounds is stipulated to be the reason behind the limited use of chlorophyll as a blood substitute in conditions like chronic anaemia, tissue hypoxia, thalassemia and other haemolytic disorders etc. Wheatgrass Juice is one of the best sources of living chlorophyll available today. Wheatgrass juice contains up to 70% chlorophyll, which is an important blood builder.
- Chlorophyll contains enzymes and super- oxide dismutase, a copper-containing protein found in mature

red blood cells. This enzyme decomposes superoxide radicals in the body into a more manageable form, thereby helping to slow down the aging process.

- Chlorophyll is the first product of light and, therefore, contains more light energy than any other food element. .
- Wheatgrass juice contains crude chlorophyll (as opposed to pure) and can be taken orally and as a colon implant without side effects. In addition, scientists have never found wheatgrass to be toxic in any amount when given to either animals or humans.
- Science has proven that chlorophyll arrests growth and development of unfriendly bacteria.
- Chlorophyll can be extracted from many plants, but wheatgrass is superior because it has been found to have over 100 elements needed by man. If grown in organic soil, it absorbs 92 of the known 115 minerals from the soil.
- Redpath R. And Davis J. C found chlorophyll packed inserted in sinuses had a drying effect, cleaning up congestion, and giving immediate relief. Congested head colds were cleared up within 24 hours. Chlorophyll neutralizes toxins in the body.
- Gruskin Benjamin (1940) recommended chlorophyll for its antiseptic benefits. The article suggests the following clinical uses for chlorophyll: to clear up foul smelling odours, neutralize Strep infections, heal wounds, hasten skin grafting, to cure chronic sinusitis, overcome chronic inner ear inflammation and infection, reduce varicose veins and heal leg ulcers, eliminate impetigo and other scabby eruptions, heal rectal sores, successfully treat inflammation of the uterine cervix, get rid of parasitic vaginal infections, reduce typhoid fever, and cure advanced pyorrhoea in many cases.
- Bircher, a research scientist, called chlorophyll, concentrated sun power. He reported chlorophyll, increases the function of heart, affects the vascular system, the intestine, the uterus and the lungs

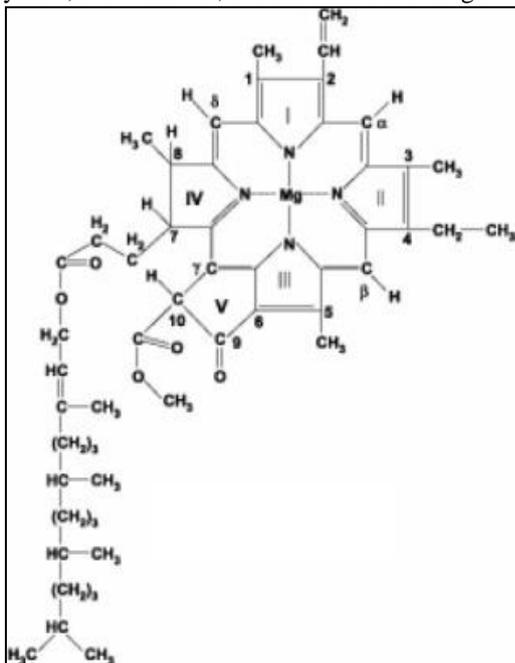


Fig. 3: Structure of Chlorophyll Molecules

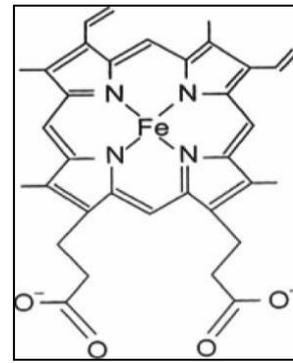


Fig. 4: Structures of Tetra Pyrrole Head of Hemoglobin

IV. CLINICAL UTILITIES AND HEALTH BENEFIT OF WHEAT GRASS JUICE

A. Prevention against Thalassemia Disease

Beta-thalassemia is a genetically inherited disorder that arises due to abnormal beta globin chains which are required for the synthesis of adult hemoglobin (HbA). The characteristic deficiency of beta globin chains, seen in thalassemia, results in the production of abnormal red blood cells (RBCs) having a preponderance of alpha globin chains. This leads to destruction of such RBCs in the spleen and a decreased number of RBCs in the blood. Individuals with thalassemia may continue to produce gamma globin chains in an effort to increase the amount of fetal hemoglobin (HbF) and compensate for the deficiency of HbA. Thus, induction of fetal hemoglobin in thalassemia can improve the patient's clinical condition. Drugs exhibiting this function like hydroxyurea are not used conventionally due to lack of specificity and greater degree of side effects. 3-5 fold increase in the production of HbF on consumption of wheatgrass has been reported using a cellular assay. This has now been confirmed by the development of a specific assay method for HbF, which is based on detecting its production in human erythroleukemia cells using a fluorescent protein gene that replaces the genes for HbF. The level and speed of induction of HbF by the wheatgrass extract is significantly greater than any of the pharmaceutical inducers available. Chlorophyll extracted from the wheatgrass plant or its synthetic derivative chlorophyllin has also been implicated in this clinical condition. The antioxidant mechanism of the various wheatgrass constituents may be responsible for the beneficial effects. The enhanced antioxidative capacity of the RBCs may prolong the survival time of not only the newly formed cells, but also of the transfused RBCs.

In one of the clinical study, thalassemic patients were administered wheatgrass juice on a daily basis, the following conclusions were drawn.

- 1) 50% patients showed upto 25% reduction in transfusion requirement.
- 2) The mean time interval between transfusions increased to 29.5%
- 3) Haemoglobin levels were not compromised by reduced transfusion volumes.
- 4) The patients reported general well-being, improved appetite and reduced musculo-skeletal aches and pains.

B. Anti-Cancer Activity

Ann Wigmore (renowned wheat grass researcher) states that the oxygen is bullet to kill cancer cells and wheat grass as a shot gun blast at cancer

The number of ways it deals with cancer is incredible. First of all it contains chlorophyll, which has almost the same molecular structure as hemoglobin. Chlorophyll increases hemoglobin production, meaning more oxygen gets to the cancer. Selenium and laetrile are also in wheatgrass, both are anticancer. Chlorophyll and selenium also help build the immune system. Furthermore, wheatgrass is one of the most alkaline foods known to mankind.

It also contains the hormone abscisic acid (also called: dormin), the antioxidant enzyme SOD (Superoxide Dismutase,) and over 30 other enzymes, the antioxidant enzyme cytochrome oxidase, laetrile, and a whole lot of other nutrients. "superoxide dismutase (SOD) – which converts two superoxide anions into a molecule of hydrogen peroxide and one of oxygen." In other words, SOD converts one of the most dangerous free radicals: Reactive Oxygen Species (ROS), into a hydrogen peroxide molecule (which has an extra oxygen molecule to kill cancer cells) and an oxygen molecule. Paul (1938) revealed that the true cause of the cancerous degeneration of a cell results from the destruction of a specific respiratory enzyme, cytochrome oxidase. In other words, cancer in the cell is caused by disturbance of oxygen utilization, or cell respiration.

C. Detoxifying Agent

The vitality of liver is of high concern for the overall well-being of an individual as it is the major organ implicated in detoxification. In addition to the stimulating and regenerative properties of chlorophyll, other constituents of wheatgrass juice like choline and its high mineral content are responsible for the therapeutic benefit.

In a study conducted to observe the effect of choline on liver, it was seen that choline prevents the deposition of fats in the experimental animals' liver when they were administered a diet rich in cholesterol. Choline promotes the removal of the esters of both cholesterol and glycerol, with the effect on the glyceride fraction preceding that on the cholesterol esters. The lipotropic action of choline is attributed to its in vivo conversion to an active compound which is retained within the hepatic cells and enhances oxidation of fatty acids and formation of tissue lecithins. The latter effect augments lipoprotein synthesis which acts as a transport form of fatty acids in plasma and thus helps in removal of lipids from a fatty liver.

D. Prevention of Skin Diseases

The bland soothing effect of chlorophyll (wheatgrass) ointments are very beneficial to the treatment of various skin diseases involving the outer and underlying layers of the skin, including: itching and burning of the rectum; ivy poisoning; weeping and dry eczema and even in conditions caused by insect bites or infection.

It has been scientifically proved that chlorophyll arrests growth and development of harmful bacteria. Wheat grass therapy can be effectively used for skin diseases and ulcerated wounds as by retarding bacterial action, it promotes cell activity and normal re-growth by drinking

wheatgrass juice regularly, an unfavourable environment is created for bacterial growth. Poultice of wheatgrass juice can be applied on the infected area, as it is an able sterilizer.

E. Protect Tooth Decay and Pyorrhoea

Wheatgrass juice held in the mouth for 5 minutes will help eliminate toothaches. It pulls poisons from the gums. Gargle wheatgrass juice for a sore throat.

1) Pyorrhoea of the Mouth

Lay pulp of wheatgrass soaked in juice on diseased area in mouth or chew wheatgrass, spitting out the pulp.

F. Healing Ulcerative Colitis

While natural health advocates have been lauding the healing properties of wheat grass for over sixty years, it is only fairly recently that a randomized, double-blind, placebo- controlled clinical study has been done to scientifically prove the effectiveness of wheat grass juice.

- Aut reported that patients who were clinically diagnosed with active distal ulcerative colitis were given 100c of wheat grass juice on completion of study, he observed reduction in disease activity, which is due to presence of antioxidants contained in wheat grass juice.
- In another clinical study, author name (year) related to the use of water-soluble derivatives of chlorophyll in over 400 cases over a period of nine months, several major effects, notably: loss of odour associated with infected wounds; a stimulating effect on tissue formation (granulation tissue) when used as a dressing particularly for burns; and a drying effect in the case of abscesses, sinus tracts, surface lesions and osteomyelitis were observed. The results of the study showed that chlorophyll was found effective in treatment of cyst wounds, fis sarcoma/carcinoma, ulcerative colitis, thoracic empyema, gunshot wound sinus tracts, decubitus ulcer and burns.

V. PRECAUTION

- Pregnant women and nursing mothers should avoid wheat grass containing supplements.
- Wheatgrass supplements may contain high amounts of vitamin K. Those on warfarin should exercise caution in the use of wheat grass supplements.

VI. ADVERSE REACTION

Wheatgrass juice is safe and the incidence of side effects is very low. It may cause nausea and headache if excessive quantities are taken.

VII. CONCLUSION

In the developing countries, many low-income families rely on simple diet which mainly consist of staple food crops such as wheat, maize, rice that are poor sources of various nutrients and minerals. To provide wholesome nutrition for a healthy and rejuvenating body green foods could be very useful in providing nutrients like vitamin, protein, antioxidant, minerals. Proponents of wheatgrass juice make many claims for its health properties, ranging from promotion of general well-being to cancer prevention. Fresh wheat grass juice has been shown to possess anti-

cancer activity, anti-ulcer activity, anti-inflammatory, antioxidant activity, anti-arthritis activity, and blood building activity in Thalassemia. It has been argued that wheat grass helps blood flow, digestion, and general detoxification of the body. To conclude wheatgrass seems to be very promising herbal drug and extensive research work is needed in order to explore its therapeutic application in various diseases.

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