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## A pilot study on wheat grass juice for its phytochemical, nutritional and therapeutic potential on chronic diseases.

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### Abstract

*Triticum aestivum* (Wheat grass juice) has high concentrations of chlorophyll, amino acids, minerals, vitamins, and enzymes. Fresh 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 due to the presence of biologically active compounds and minerals in it and due to its antioxidant potential which is derived from its high content of bioflavonoids such as apigenin, quercetin, luteoline. Furthermore, indole compounds, amely choline, which known for antioxidants and also possess chelating property for iron overload disorders. The presence of 70% chlorophyll, which is almost chemically identical to haemoglobin. The only difference is that the central element in chlorophyll is magnesium and in hemoglobin it is iron. In wheat grass makes it more useful in various clinical conditions involving hemoglobin deficiency and other chronic disorders ultimately considered as green blood.

**Keywords:** Antioxidant, Anti-cancer activity, Wheat Grass juice, Haemoglobin, *Triticum aestivum*, enzymes, vitamins, nutrients.

### 1. Introduction

Modern science has already accepted the potential of herbs as a source of new bio-active constituents.

*Triticum aestivum* Linn. Commonly called wheat grass, belonging to the family: Gramineae. [1] *Triticum* is a genus of annual and biennial grasses. In early growth stages the wheat plant consists of a much-compressed stem or crown and numerous narrowly linear or linear-lanceolate leaves, yielding various types of wheat, native to southwest Asia and the Mediterranean region and widely cultivated almost all over the world. Generally, 15-20 species are recognized. Wheat grass is a good source of mineral nutrients. It contains significant amounts of iron, phosphorus, magnesium, manganese, copper & zinc. Wheatgrass is a rich source of tocopherols with high vitamin E potency.

The presence of 70% chlorophyll, which is almost chemically identical to haemoglobin. Both chlorophyll and hemoglobin share a similar atom structure to create their respective molecules. [2] The only difference is that the central element in chlorophyll is magnesium and in hemoglobin it is iron [3] Wheat grass stimulates metabolism, restores alkalinity to the blood, its abundance of alkaline minerals helps reduce over acidity in the blood. Wheatgrass is also a detoxificant and helps restore healthy cells [4].

Wheat grass, young grass of the common wheat plant, is freshly juiced or dried into powder for animal and human consumption- both the forms provide chlorophyll, 17 amino acid, eight of which are essential minerals, vitamins and enzymes [5]. Wheat Grass Juice (WGJ) is an extract squeezed from the mature sprouts of wheat seeds.

Wheatgrass has been traditionally used, since ancient times, to treat various diseases and disorders. Presently, there are a number of wheat grass suppliers, in almost all cities of India, supply fresh wheatgrass, on daily basis to their regular customers by home-delivery system for various ailments and as health tonic. Dr. Ann Wigmore, U.S.A. founder director of the Hippocrates Health Institute, Boston, U.S.A. was one of the proponents of 'Wheatgrass Therapy'. Dr. Wigmore reported that "wheatgrass" used in her program contain abscisic acid and laetrile, both of which may have anti-cancer activity. It was also reported that young grasses and other chlorophyll-rich plants are safe and effective treatment for ailments such as high blood pressure, some cancers, obesity, diabetes, gastritis, ulcers, pancreas and liver

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problems, fatigue, anemia, asthma, eczema, hemorrhoids, skin problems, halitosis, body odor and constipation [6]. Scientific reports on nutritional analysis of wheatgrass have been published frequently in various journals. [7, 8] These reports and 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, anti-anemic factors like vitamin B12, iron, folic acid, pyridoxine and many other minerals, amino acids and enzymes, which have significant nutritious and medicinal value. Clinically it was proved that different varieties of wheatgrass extracts are therapeutically used in treatment of anemia, thalassemia (major), cancer and bacterial diseases [9].

The supplement is available commercially in liquid, powdered or concentrated forms, depending on the supplier and can be consumed on its own, or mixed with fruit juices. Wheatgrass juice has been shown to have some medicinal value; a review of the scientific literature found studies reporting high levels of antioxidants [10, 11, 12]. It has demonstrated anti-cancer properties both *in-vitro* and *in-vivo*, [13, 14, 15, 16] and has been found to reduce the frequency of blood transfusions in thalassemia patients [17, 18]. Scientific studies regarding the health benefits of chlorophyll have shown anti-cancer effects in animal models, and studies have been extended to human subjects. Two studies published in 2005 and found that chlorophyll inhibited haem-induced cytotoxicity and reduced epithelial cell turnover (hypoproliferation) in rat colons [19, 20].

## 2. Phytochemistry

The name "green blood" of wheatgrass is attributable to its high chlorophyll content which accounts for 70% of its total chemical constituents [21, 22]. Wheatgrass juice is a rich source of Vitamins A, C, E and B complex. It contains a plethora of minerals like calcium, phosphorus, magnesium, alkaline earth metals, potassium, zinc, boron, and molybdenum. The various enzymes responsible for its pharmacological actions are protease, amylase, lipase, cytochrome oxidase, transhydrogenase, super oxide dismutase (SOD). The other notable feature of wheatgrass is its high proportion of amino acids such as aspartic acid, glutamic acid, arginine, alanine and serine. [23]

The major clinical utility of wheatgrass juice is due to its antioxidant action which is derived from its high content of bioflavonoids like apigenin, quercetin and luteolin. Other compounds present, which make this grass therapeutically effective, is the indole compounds, apigenin and laetrole. [Figure 1] and [Figure 2]. The different constituents of wheatgrass occurring in different proportions are represented in [Table 1 and 2] [21].

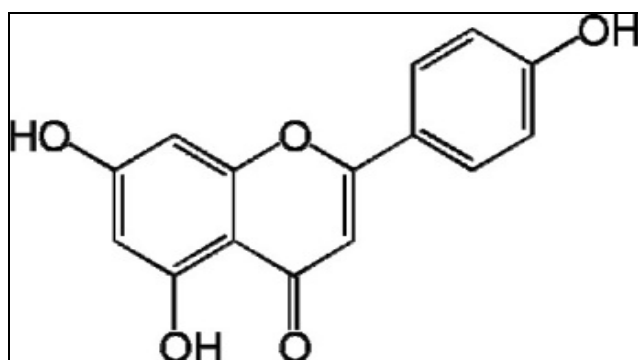


Fig 1: Structure of Apigenin

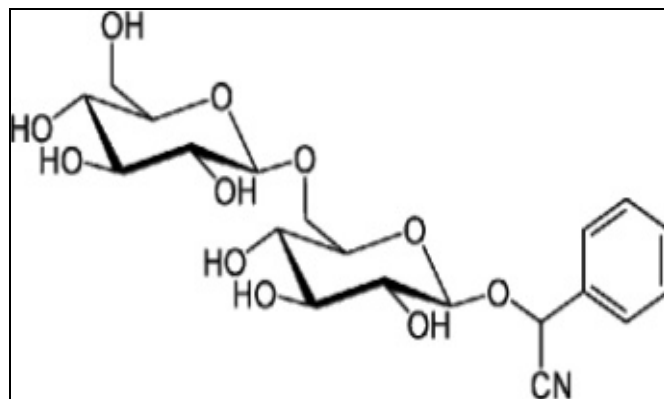


Fig 2: Structure of Laetrole

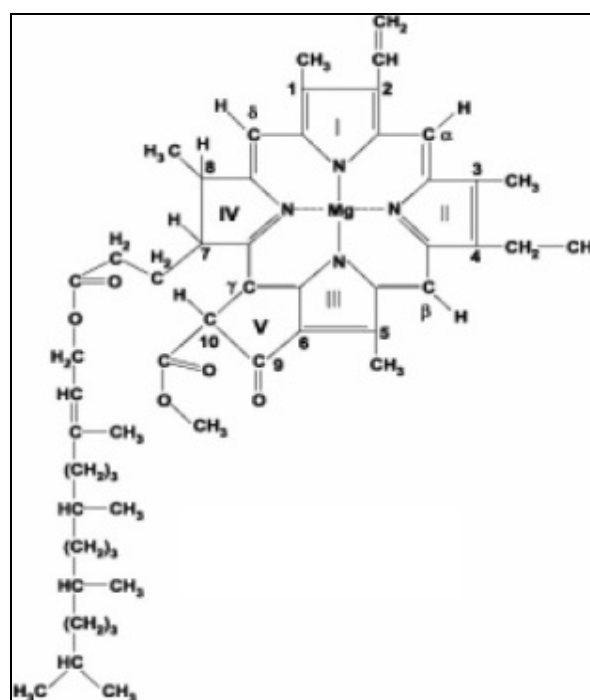


Fig 3: Structure of Chlorophyll Molecules

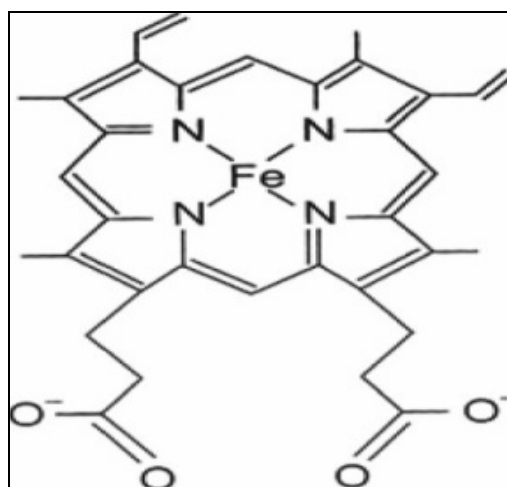


Fig 4: Structure of Tetra Pyrrole Head of Hemoglobin

**Table 1:** Levels of Vitamins and Minerals in 100 ml of Wheat Grass Juice. [23]

Vitamins & minerals	Amount (mg/100 ml)
Ascorbic acid	25.2
Dehydroascorbic acid	7.6
Vitamin E	8.5
Carotene	2.43
Potassium	57
Phosphorus	8.2
Calcium	2.4
Sulfur	2.37
Magnesium	1.7
Sodium	1.42
Aluminum	0.31
Zinc	0.02
Copper	0.007

**Table 2:** The Contents of Amino Acids in Wheat Grass Juice. [23]

Amino acid	Amount ( $\mu\text{g/ml}$ )
Aspartic acid	510.3
Threonine	105.8
Serine	201.8
Asparagine	3039.6
Glutamine	200.6
Proline	33.6
Glycine	20.6
Alanin	166.4
Valine	272.1
Methionine	14.0
Isoleucine	145.1
Leucine	101.0
Tyrosine	121.8
Phenylalanine	200.9
Lysine	174.5
Histidine	232.2
Tryptophan	160.1
Arginine	252.9

In a study conducted to determine the elemental concentration profile of wheatgrass using instrumental neutron activation analysis, it was found that the concentration of elements such as K, Na, Ca and Mg increased linearly in the shoots with the growth period, whereas the concentrations of the elements namely Zn, Mn and Fe remained constant in shoots after 8th day of plant growth for all three conditions of growth. However, it was observed that the shoot to root concentration ratio in all the conditions increased linearly for K, Na, Ca, Mg and Cl and decreased for Zn, Fe, Mn, and Al with growth period [24].

### 3. Therapeutic-potential

#### i) Chlorophyll as green blood

The analogy between chlorophyll and hemoglobin can be demonstrated with respect to the structure of their porphyrin heads. [Figure 3] and [Figure 4] 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 anemia, tissue hypoxia, thalassemia and other hemolytic disorders etc.

#### ii) Blood building activity in Thalassemia major

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 [25]. 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 [26] 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 [27]. 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 anti-oxidative capacity of the RBCs may prolong the survival time of not only the newly formed cells, but also of the transfused RBCs [28]. In a clinical study, wherein the thalassemic patients were administered wheatgrass juice on a daily basis, the following conclusions were drawn -

- 50% patients showed up to 25% reduction in transfusion requirement.
- The mean time interval between transfusions increased to 29.5%
- Hemoglobin levels were not compromised by reducing transfusion volumes.
- The patients reported general well-being, improved appetite and reduced musculo-skeletal aches and pains [17].

#### iii) Adjuvant therapy in haemolytic anemia

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 of red blood cell (RBC) antioxidant function and corresponding effects on cellular enzyme function and membrane integrity. This thought is supported by studies that show decreased antioxidant capacities of RBCs of patients with hemolytic disorders as well as beneficial effects on RBC life-span by supplementation of antioxidants *in vivo* [29].

The response to this therapy took some months (called as the "neutral period") which may suggest that the natural antioxidants contained in the wheatgrass juice are better able to avert cellular injury than to repair RBC enzymes/membranes once damaged. Hence, RBCs, once damaged, would be cleared from the circulation by the reticuloendothelial system as they would prior to the onset of this therapy, but newly formed RBCs would not be damaged and would have a longer life-span. While clinical trials are currently underway to find suitable blood substitutes for patients needing blood transfusions, they may not be readily available in developing countries nor would they be preferable to natural therapies aimed at preserving a patient's own RBCs. Therefore, wheatgrass juice and other nutritional therapies may be considered as an adjuvant to drug therapy.

#### iv) Anticancer activity

Wheat grass juice is alternative medicine (CAM) approach of anticancer therapy, due to its high antioxidant content chlorophyll, laetrile and antioxidant enzyme super oxide dismutase (SOD) which converts dangerous free radical reactive oxygen species (ROS) into hydrogen peroxides (having extra oxygen molecule to kill cancer cells) and an oxygen molecule<sup>[30]</sup>.

Chlorophyll, like other tetra-pyrroles, has the ability to induce mammalian phase 2 proteins that protect cells against oxidants and electrophiles. The capacity of this compound to induce the phase 2 response depends upon its ability or that of its metabolites to react with thiol groups. Its pseudo second-order rate constant is correlated with its potency in inducing the phase 2 enzyme NAD (P) H:quinoneoxidoreductase 1 (NQO1) in murine hepatoma cells. One of the most potent inducers was isolated from chlorophyllin, a semisynthetic water-soluble chlorophyll derivative. Although chlorophyll itself is low in inducer potency, it may nevertheless account for some of the disease-protective effects attributed to diets rich in green vegetables like wheatgrass because it occurs in much higher concentrations in these plants.<sup>[31]</sup>

Another constituent of wheatgrass implicated as an anticancer agent is the plant hormone abscisic acid (ABA). This hormone is 40 times more potent 4 hours after cutting the wheatgrass plant. ABA can neutralize the effect of the hormone chorionic gonadotropin and a compound similar to this hormone has been found to be produced by the cancer cells<sup>[32]</sup>.

A novel anticancer approach utilizes high alkalinity in the cancer chemotherapy. Firstly, an alkaline diet helps to reduce the number of microbes in the diet. This attenuates the incidence of secondary infections to a certain degree in the patient. Secondly, the cancer cells succumb in a highly alkaline environment. As the pH of the wheatgrass juice is around 7.4, it is being considered a viable option under this approach<sup>[33]</sup>. Other postulated mechanisms by which wheatgrass juice appears beneficial include antioxidant activity in preventing oxidative damage to deoxyribonucleic acid (DNA) and lipid peroxidation, stimulation of gap junction communication, effects on cell transformation and differentiation, inhibition of cell proliferation and oncogene (cancer causing gene) expression, effects on immune function and inhibition of endogenous formation of carcinogens.<sup>[34]</sup> Furthermore, chlorophyll derivatives have also been found to provide beneficial effects in liver, colon, stomach and gastrointestinal cancer cases<sup>[35, 36, 37, 38]</sup>. *In vitro* studies with chlorophyllin on animal model have shown that chlorophyllin is an inhibitor of the cytochrome P-450 liver enzymes<sup>[39]</sup>. All *in vivo* (whole animal) studies where cytochrome P-450 enzyme activity is reduced, resulting in lower cancer rates and

longer lifespan.<sup>[40]</sup>

Aqueous extracts of wheatgrass are good sources of antioxidants. Significant antioxidant activity was demonstrated by *in vitro* studies<sup>[11]</sup>. The clinical studies conducted on human breast cancer have shown that chlorophyllin, a compound that is similar to chlorophyll produced synthetically, has capability to reduce the risk of breast cancer<sup>[41]</sup>.

In another *in vitro* study it was found that wheat sprout extract inhibited the metabolic activation of carcinogens and decreased their cancer causing ability by up to 99 percent.<sup>[42]</sup>

#### v) Anti-ulcer activity

In a randomized, double-blind, placebo-controlled study on WGJ<sup>[42]</sup> observed that the use of wheat grass (*Triticumaestivum*) juice is very effective and safe as a single or adjuvant treatment of active distal Ulcerative colitis (UC). Green juice and fractions from green juice of young barley leaves containing water soluble proteins and water soluble organic compounds showed anti-stomach ulcer activity in stressed rats. In another clinical study 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, fistula-in-ano, sarcoma/carcinoma, ulcerative colitis, thoracic empyema, gunshot wound sinus tracts, decubitus ulcer and burns. Further, it has been observed that in fractures of limbs chlorophyll reduced odour and enhanced healing, in some cases with exceptional results, e.g. legs saved from seemingly inevitable amputation. These clinical studies suggest that chlorophyll may be best agent known for use in the treatment of suppurative diseases, indolent ulcers or wherever stimulation of tissue repair is desired<sup>[43, 44]</sup>. Which are believed to possess both anti-inflammatory and antioxidant properties as it is rich in bioflavonoid. One of these bioflavonoid, apigenin, has been shown to inhibit tumour necrosis factor induced transactivation<sup>[42, 45]</sup>.

In another study chlorophyll was used in an experiment with cutaneous wounds in guinea pigs, and in treating dermatome donor sites, clinical burns and surgical wounds and ulcers in human patients<sup>[47]</sup>. The studies related to the use of chlorophyll in stimulating tissue growth have shown that chlorophyll ointment and aqueous solutions are useful in the treatment of skin ulcer<sup>[48]</sup>.

Further chlorophyll derivatives have also been shown to exhibit anti-inflammatory, wound healing and odor reducing capabilities. Chlorophyllin has bacteriostatic properties aiding in wound healing, and stimulates the production of hemoglobin and erythrocytes in anemic animals. It has been used to treat various kinds of skin lesions, burns and ulcers where it acts as a wound healing agent, stimulating granulation tissue and epithelization<sup>[21, 49]</sup>.

#### vi) Antioxidant activity

The antioxidant activity of wheatgrass extract was observed at various levels of protection such as primary and secondary radical scavenging and inhibition of free radical induced membrane damage. This can possibly be explained on the basis of its chemical content. It has been shown that these extracts contain significant amounts of phenolic compounds including flavonoids. Recently it was shown that during germination, some biologically active compounds were

synthesized in the wheat sprouts [50, 51, 52]

Wheat sprouts reached the maximum antioxidant potential after 7 days of plant growth. Wheatgrass, in general, has been reported to possess therapeutic properties in diseases such as ulcerative colitis and thalassaemia major [17, 42]. In addition to this, wheat sprout extracts were found to be antimutagenic in the Ames test [53] capable of inhibiting oxidative DNA damage [10] and responsible for metabolic deactivation of carcinogens [54].

Many of the studies showed that water extracts of wheatgrass are a good source of antioxidants. In view of its antioxidant potential and the ease with which it can be home-grown under known environmental conditions, wheatgrass extracts can be used as a dietary supplement for antioxidant compounds such as polyphenols and flavonoids [24].

#### vii) Detoxifying Activity

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 wheat-grass 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 [55].

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 the 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 [56].

It has been demonstrated experimentally that the dietary indoles like indole-3-carbinol and ascorbigen increase the activity of phase I and phase II xenobiotic metabolic enzymes in the liver and intestinal mucosa [57]. Thus the indole compounds of wheatgrass may have a role in the deactivation of carcinogens.

#### viii) Anti-arthritis activity

In a study to see the effect of uncooked vegetarian diet rich in lactobacilli, in rheumatoid patients randomized into diet and control groups, it has been observed that uncooked vegetarian diet, rich in lactobacilli, decreased subjective symptoms of rheumatoid arthritis. The studies indicated that the following group of dietary factors was partially (48%) responsible for the observed decrease in the disease activity index: fermented wheat drink, wheat grass drink, dietary fiber and iron. The studies showed significant response in arthritic patients [58, 59].

#### ix) Anti-inflammatory activity

Wheat grass juice exhibit anti-inflammatory, wound healing and odor reducing capabilities. Chlorophyllin has bacteriostatic properties aiding in wound healing, and stimulates the production of hemoglobin and erythrocytes in anemic animals. It has been used to treat various kinds of skin lesions, burns and ulcers where it acts as a wound healing agent, stimulating granulation tissue and epithelization [48].

### 4. Ways to Treat Some Common Aliments:

#### i) Internal Rejuvenation

Wheat protein, which comprises up to eight per cent of the

grain, has a special benefit as it has eight of the essential amino acids in delicately balanced proportions. A complete internal rejuvenation takes place when Wheat protein is metabolized into health-building amino acids. These amino acids build a resilient muscle that comes back to its original form after stretching and bending, healthy skin and hair and clearer eyesight and nourish the heart and lungs, tendons and ligaments, brain, nervous system and glandular network. The B-complex vitamins, especially thiamine, riboflavin and niacin offered by natural brown Wheat promote youthful energy and nourishment to the skin and blood vessels. An abundance of minerals in natural brown Wheat helps to nourish the hormonal system, heal wounds and regulate blood pressure. Wheat also offers iron to enrich the bloodstream and phosphorus and potassium to maintain internal water balance along with other nutrients. Wheat, thus helps restore internal harmony [60, 61, 62].

#### ii) Tooth Disorders

Wheat is valuable in the prevention and cure of pyorrhea. It takes time to eat wheat and as it is generally taken with other foods, it compels the chewing of other foods also. This not only provides the needed exercise for the teeth and gums but also a great aid to digestion. Wheatgrass juice acts as an excellent mouth wash for sore throats and pyorrhea. It also prevents tooth decay and tooth aches. Therefore, it is beneficial to chew wheat grass which draws out toxins from the gums and thus checks bacterial growth.

#### iii) Constipation

The bran of wheat, which is generally discarded in milling of the flour, is more wholesome and nourishing than the flour itself. It is an excellent laxative. The laxative effects of bran are much superior to those fruits or green vegetables as cellulose of the latter is more easily broken down by bacteria while passing through the intestine. The bran is highly beneficial in the prevention and treatment of constipation due to its concentration of cellulose, which forms a bulk-mass in the intestines and helps easy evacuation due to increased peristalsis.

#### iv) Skin Diseases

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. Externally, wheat flour is useful as a dusting powder over inflamed surface as in burns, scalds and various itching and burning eruptions, Whole wheat flour, mixed with vinegar, boiled and applied outwardly removes freckles. [48]

#### v) Digestive System Disorders

Wheat grass juice used as an enema helps detoxify the walls of the colon. The general procedure is to give an enema with lukewarm or Neem water. After waiting for 20 minutes, 90 to 120 ml of wheat grass juice enema is given. This should be retained for 15 minutes. This enema is very helpful in disorders of the colon, mucous and ulcerative colitis, chronic constipation and bleeding piles [63]

#### vi) Circulatory Disorders

The chlorophyll content present in wheat enhances heart and

lung functions. Capillary activity also increases while toxemia or blood poisoning is reduced. Due to increased Iron content in the blood and hemoglobin, lungs function better. Oxygenation improves and the effect of carbon dioxide is minimized. It is for this reason that wheatgrass juice is prescribed for circulatory disorders<sup>[64]</sup>.

#### vii) For Treating Boils

Boils having pus can be easily treated at home without the help of a surgeon's knife. Pound a little Alse (available at shops) to a fine powder. Take a tablespoon of wheat flour and fry it in a little oil to a golden colour. Add ground Alse along with a tablespoon of water. Keep on stirring until the mixture turns thick. Remove from fire and place it on a clean strip of cloth. When the mixture turns bearably hot, spread it over the cloth and bandage the boil. Within a day or two, the boil will burst, giving instant relief. Clean the boil with warm water to which a little boric has been added and then apply sulphur ointment and bandage. Clean the wound and apply the ointment daily until the wound heals.

#### viii) For Treating Scars

To remove scars roast wheat on fire until it turns black. Grind to paste. Put in a thin cloth and squeeze out the oil. Apply on the scars regularly for relief. Even itching disappears with this oil.

### 5. Conclusion

Widespread data from a number of studies has made known the multitude effects of Wheatgrass is known to help diminish fatigue, improve sleep, increase strength, naturally regulate blood pressure and blood sugar, support weight loss, improve digestion and elimination, support healthy skin, teeth, eyes, muscles and joints, improve the function of our heart-lungs and reproductive organs, heal ulcers and skin sores, slow cellular aging, improve mental function, and is beneficial in arthritis and muscle cramping, thalassemia, hemo-lytic anemia, cancer, asthma, allergy, inflammatory bowel disease and detoxification. Thus, it should be made part of daily dietary intake in order to explore its utmost benefits. The structural homology of chlorophyll with hemoglobin indicates the role of chlorophyll as a blood builder in various clinical conditions involving hemoglobin deficiency - thus the name "green blood". 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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