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Therapeutic role of “Wheat grass” (*Triticum aestivum* Linn.) in iron deficiency anaemia

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Abstract

The present study was undertaken to put forward the scientific evidences of wheatgrass as an alternative therapy to treat Iron Deficiency Anaemia (IDA). Anaemia is a haematological condition in which, there is quantitative deficiency of circulating haemoglobin, often accompanied by a reduced number of red blood cells. Further, causes of anaemia are blood loss, impaired erythropoiesis and abnormal erythrocyte destruction. Nutritional deficiencies (iron, vitamin B12 and folic acid) are the most common cause of anaemia throughout the world. One ounce of wheatgrass contains 120 calories, 8 grams of dietary fiber, 240% of the RDA of vitamin A, 93% of the RDA of vitamin C, 356% of the RDA of iron, 12% of the RDA of calcium, 8 grams of protein. And it also contains 98 of 102% earth elements found in soil, including phosphorus, calcium, iron, magnesium, and potassium as well as essential enzymes and 19 amino acids. Wheatgrass is also overflowing with vitamins, and minerals. Many studies shown that wheatgrass juice, dried powder positive results in treating of IDA, Cancer, Thalassemia, Rheumatoid Arthritis, inflammatory conditions, Diabetes, obesity so on.

Keywords: iron deficiency anaemia, haemoglobin, RDA, vitamins, minerals

Introduction

Nutritional anemia is one of India's major public health problems. The prevalence of anemia ranges from 33% to 89% among pregnant women and is more than 60% among adolescent girls. Anemia in pregnant women and adolescent girls has serious health implications. Severe anemia during pregnancy significantly contributes to maternal mortality and morbidity^[1]. There is evidence that severe anemia also increases perinatal morbidity and mortality by causing intrauterine growth retardation and preterm delivery^[2]. Anemia in adolescent girls affects their physical work capacity and reproductive physiology^[3]. According to a World Health Organization (WHO) report^[4], the global prevalence of anemia among pregnant women is 55.9%. In India, the prevalence of anemia in pregnant women has been reported to be in the range of 33% to 89%^[5]. According to the limited number of studies from India, the prevalence of anemia in adolescent girls is also fairly high^[6]. Anemia results both from nutrition-related causes and from inflammatory or infectious diseases, as well as from blood loss. Iron-Deficiency Anemia resulting from inadequate intake and low absorption of dietary iron is the most common form of anemia in India^[7].

The overall prevalence of anemia among adolescent girls was 90.1%; the prevalence rates of mild, moderate, and severe anemia were 32.1%, 50.9%, and 7.1% respectively. In a study of 1,500 rural girls 10 to 19 years of age from 10 villages in Gujarat, the prevalence of anemia

¹World Health Organization. Prevention and management of anaemia in pregnancy. WHO/FHE/MSM/93.5. Geneva: WHO, 1993.

²Prema K, Neel Kumari S, Rama Lakshmi BA. Anaemia and adverse obstetric outcome. Nutr Rep Int 1981; 23:637–43.

³Seshadri S. Nutritional anaemia in South Asia. In: Gillespie SK, ed. Malnutrition in South Asia: A regional profile. UNICEF Regional Office for South Asia, 1997:75–124.

⁴World Health Organization. The prevalence of anaemia in women. WHO/MCH/MSM/92.2. Geneva: WHO, 1992.

⁵Seshadri S, Sharma K, Raj AE, Thekore B, Saiyed F. Iron supplementation to control pregnancy anaemia. Proc Nutr Soc India 1994; 41:131–40.

⁶Kanani S, Ghanekar J. Anaemia and adolescent girls: A review of research evidence and intervention strategies, 1997. Department of Food and Nutrition, MS University of Baroda and UNICEF, India.

⁷Rao BSN. Studies on iron deficiency anaemia. Indian J Med Res 1978; suppl 68:58. Toteja GS, Singh P. Micronutrient profile of Indian population. New Delhi: Indian Council of Medical Research, 2004.

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(hemoglobin < 120 g/L) was reported to be 60%.⁴ A recent study conducted in rural, tribal, and urban areas in Vadodara District of Gujarat found a 74.7% prevalence of anemia. After weekly supplementation with iron–folic acid tablets, the prevalence was reduced by 20.5%, with a mean rise in hemoglobin level of 6.9 g/L, a result suggesting that iron deficiency was the predominant causal factor of anemia^[8]. The anemia prevalence among adolescent girls in Delhi was 46.6% for those in the high socioeconomic group and 56% for those in the lower-middle socioeconomic group^[9]. An 11-country study found that more than 40% of adolescents in Asian countries, including India, were anemic (hemoglobin < 115 g/L). A review of Indian studies by Kanani and Ghanekar^[10] found that more than 70% of adolescent girls from low-income families had hemoglobin levels of less than 110 g/L. When the WHO cutoff value of 120 g/L was applied the prevalence was even higher (80% to 90%).

Incidence of Iron Deficiency Anaemia

Iron deficiency occurs when there is an insufficient intake of iron—primarily found in flesh foods and, to a lesser extent, dairy products and plant foods— as well as in fortified foods or supplements. Iron deficiency can also be caused by poor absorption and excessive loss of the mineral, including blood loss. The more severe stages of iron deficiency can result in anemia when there is not enough iron to produce adequate amounts of hemoglobin for red blood cells (WHO and CDC 2004)^[11]. Iron deficiency is a major contributor to anemia, though the actual extent of overlap between iron deficiency and anemia is context-specific and varies by setting (Kassebaum and GBD 2013 Anemia Collaborators 2016)^[12]. Specific groups at an increased risk of iron deficiency include children due to rapid growth, pregnant women due to expansion of the red blood cell mass and the need for more iron for the fetus, and women of reproductive age, including adolescent girls due to blood loss during menstruation.

The movement for the human consumption of wheatgrass began in the western world in the 1930s and was initiated by Charles F. Schnabel, known as the father of wheatgrass (Anderson 1986)^[13]. He said 'Fifteen pounds of wheatgrass is equivalent to 350 pounds of the choicest vegetables' Later Wigmore healed herself of cancer from the weeds she found in vacant lots in Boston. She began a study of natural healing modalities-and with the help of a friend, Dr. Earp Thomas, she found that there are 4700 varieties of grass in the world and all are good for man.

⁸Kotecha PV, Patel RZ, Karkar PD, Nirupam S. Impact evaluation of adolescent girls anaemia reduction programme, Vadodara District, Government Medical College, Vadodara, 2002.

⁹Kapoor G, Aneja S. Nutritional disorders in adolescent girls. *Indian Pediatr* 1992; 29:969–73.

¹⁰Kanani S, Ghanekar J. Anaemia and adolescent girls: A review of research evidence and intervention strategies, 1997. Department of Food and Nutrition, MS University of Baroda and UNICEF, India.

¹¹World Health Organization and CDC. 2004. "Assessing the Iron Status of Populations: Including Literature Reviews." 2nd ed. Joint World Health Organization/Centers for Disease Control and Prevention Technical Consultation on the Assessment of Iron Status at the Population Level. Geneva, Switzerland.

¹²Kassebaum, Nicholas J., and GBD 2013 Anemia Collaborators. 2016. "The Global Burden of Anemia." *Hematology/ Oncology Clinics of North America* 30 (2): 247–308. doi:10.1016/j.hoc.2015.11.002.

¹³Anderson, J. (1986) Fiber and health: an overview. *Am. J. Gastroent.* 10: 892- 897

"Wheat grass" used in her programme 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 a safe and effective treatment for ailments such as high blood pressure, some cancers, obesity, diabetes, gastritis, ulcers, pancreas and liver problems, fatigue, anemia, asthma, eczema, hemorrhoids, skin problems, halitosis, body odor and constipation (Wigmore 1985)^[14].

A wide range of health benefits have been attributed to wheatgrass, the young grass of the common wheat plant *Triticum aestivum*. Its components include chlorophyll, flavonoids, and vitamins C and E. Forms of wheatgrass include fresh juice, frozen juice, tablets, and powders, with compositions varying according to their production processes, as well as to the growing conditions of the wheatgrass. Laboratory in vitro studies, mostly using the fermented wheat germ extract, have demonstrated anti-cancer potential and have identified apoptosis as a possible mechanism. In animal experiments, wheatgrass demonstrated benefits in cancer prevention and as an adjunct to cancer treatment, as well as benefits to immunological activity and oxidative stress. Clinical trials show that wheatgrass may induce synergistic benefits to chemotherapy and may attenuate chemotherapy-related side effects, as well as benefit rheumatoid arthritis, ulcerative colitis, haematological diseases, diabetes, obesity, and oxidative stress. However, all the trials were small and a number of methodological problems arose. No adverse events of wheatgrass have been reported, although some forms pose problems of tolerability. The popularity of wheatgrass continues to grow. Nevertheless, the advantages seen in the clinical trials need to be proved in larger studies before clinical recommendations for the public can be given. (Bar-sela *et al*, 2015)^[15].

S.K. Chouhan and R. Mogra (2014)^[16] stated Wheatgrass (*Triticum Aestivum*) is mentioned in Ayurveda, an Indian herbal system of medicine. Ayurveda describes it as immune modulator, antioxidant, astringent, laxative, diuretic and antibacterial. Wheatgrass is used for the treatment of acidity, colitis, kidney malfunction, swelling wounds and vitiated conditions. Wheatgrass (*Triticum Aestivum*) belongs to the family of Poaceae, which has many medicinal values and health benefits. They are excellent source of vitamin, minerals, antioxidant, amino acids, protein, chlorophyll and active enzymes.

Germinated Wheat was processed and grown as grass. This grass was dried in shade and powdered to obtain wheatgrass powder. Dried powder of wheatgrass was analyzed for its physio- chemical, proximate composition. Results revealed that proximate composition of moisture 11.4 ± 0.50 , fat 22.5 ± 1.60 , protein 1.9 ± 0.69 , fibre 16.6 ± 0.68 , ash 5.2 ± 0.50 , carbohydrates 42.2 ± 0.8 , energy 275.9 ± 1.20 g/100g and calcium 186.6 ± 15.27 , iron 60.23 ± 5.05 , phosphorus 17.6 ± 0.24 , oxalic acid 47.3 ± 0.65 mg/100g.

¹⁴Wigmore, A. (1985) *The wheatgrass Book*. Avery Publishing Group. Wayne, New Jersey

¹⁵Bar-Sela G1, Cohen M, Ben-Arye E, Epelbaum R., *Mini Rev Med Chem*. 2015;15(12):1002-10, Retrieved from <https://www.ncbi.nlm.nih.gov/pub/med/26156538>

¹⁶S.K. Chouhan and R. Mogra (2014) "Development and quality evaluation of wheatgrass powder" *Food Sci. Res. J.*, 5(1): 26-29.

Mathur S. *et al.*, (2017)^[17] Therapeutic Use of Wheat Grass Juice for the Treatment of Anemia in Young Women of Ajmer City (Rajasthan, India) The fresh juice of *Triticum aestivum* (the common wheat plant) prepared from Cotyledons of wheat extensively is being used for therapeutic purposes. Wheat grass juice is rich in chlorophyll (whose structure is similar to haemoglobin except the central moiety), amino acids, minerals (like Iron), vitamins (like B₁₂), and active enzymes. The pH of blood and wheat grass juice is also the same i.e. 7.4. Therefore wheat grass juice gets quickly absorbed in the blood and is often referred to as Green Blood and is used therapeutically for the treatment of various problems including anemia, thalassemia, etc. Most of the subjects were found moderately anaemic in the beginning. After 1 month of Intervention with wheat grass juice there was an Average 3g/dl increase in haemoglobin level of test group and no change was seen in the control group. Results showed that the juice also acted as a laxative as it relieved constipation among many subjects.

M. Chauhan (2014)^[18] "A pilot study on wheat grass juice for its phytochemical, nutritional and therapeutic potential on chronic diseases" *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-arthritic 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.

Pawar Kiran Bhikaji *et al.*, (2015)^[19] "The effect of wheatgrass juice on hemoglobin level W.S.R. to Samanya-Vishesha Siddhanta" W.H.O. guideline denotes hemoglobin level in healthy male below 13 g/dl is abnormal and in female below 12g/dl is abnormal. This condition refers as 'Anaemia'. There are several types of anaemia. It develops mainly because of lack of proper food habits. Wheat grass juice is rich source of minerals, vitamins, antioxidants, amino acids and many enzymes. It is significant nutritious and medicinal value with rich source of chlorophyll. Chlorophyll resembles with hemoglobin as both are chromo protein. Chemical component of both compounds are nearly

same. Also the vital component of wheat grass helps in building hemoglobin in our body. The presence of 70% chlorophyll, which is almost chemically identical to hemoglobin. The only difference is that the central element in chlorophyll is magnesium and in hemoglobin it is iron. Chlorophyll in wheat grass is more useful in various clinical conditions involving hemoglobin deficiency and other chronic disorders ultimately considered as green blood. This study aims to evaluate the effect of wheatgrass fresh juice on hemoglobin level. Here 30 subjects were selected in the study and divided into 3 groups on basis of their hemoglobin level. Group A having Hb%, 13gm% to 16gm%, group B having Hb% 10gm% to 13gm% and group C having Hb% below 10gm%. After 21 days the symptomatic improvement and increase in hemoglobin level in group C was noticed as compared to group A and group B. No significant therapy is there for chronic anaemias in modern science. So an attempt has been made to evaluate the efficacy of wheat grass juice on hemoglobin level in the subjects having normal as well as abnormal hemoglobin level.

Marawaha RK, *et al.* 2004^[20] a pilot study on wheat grass juice reduces transfusion requirement in patients with thalassemia, conducted by Indian pediatrics. Wheat grass juice is the juice extracted from the pulp of wheatgrass and has been used as a general purpose health tonic for several years several patients in the thalassemia [a hereditary form of anemia occurring chiefly in people of Mediterranean origin, marked by the abnormal synthesis of hemoglobin and a consequent shortened life span of red blood cell] unit began consuming wheat grass juice after anecdotal accounts of beneficial effects on transfusion requirements. Families of patients raised the wheatgrass at home in kitchen garden/pots. The patients consumed about 100ml (a little one 3 ounces) of wheatgrass juice daily. Each patient acted as his own control observations recorded during the period of intake of blood juice were compared with the one year period proceeding it. A beneficial effect of wheatgrass juice was defined as a decrease in the requirement of packed red cells by 25% (or) more 16 cases were analysed. Blood transfusion requirements fell by > 25% in 8 (or) 50% of the patients, patients with a decrease in transfusion needs of > 40% were also documented in 3 of these. No perceptible adverse effects were recognized.

Conclusion

The use of wheat grass juice for increasing the blood haemoglobin level is one of the simple remedy for treating Iron deficiency anemia. The beneficial effects of wheat grass, increases the red blood count, acts as blood builder in thalassemia major, Adjuvant therapy in hemolytic anemia, Supportive care for terminally ill cancer patients and many chronic disorders.

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